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# Practical Hints

FOR

# FURNITURE MEN.

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# PRACTICAL HINTS

FOR

# FURNITURE MEN.

RELATING TO

All kinds of Finishing, with full directions thereto—Varnishes—Polishes—Stains for Wood—Dyes for Wood—Gilding and Silvering—Receipts for the Factory—Lackers, Metals, Marbles, &c.—Pictures, Engravings, &c.—Miscellaneous.

THE FURNITURE TRADE JOURNAL,

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# FINISHING.

FINISHING is the process of applying to the surface of wood a thin coating of varnish or other substance, to render it durable, enhance its beauty or change its appearance. There are numerous methods of finishing, and a variety of materials are used; the varieties of varnish being the principal. The distinctive qualities of these varieties are treated under the article VARNISHES.

In their natural state all woods are more or less porous, consisting of bundles of hard fibres, with interstices filled with a softer substance. These constitute the grain, and as the hard or soft parts predominate the wood is said to be hard, fine, or close-grained, or soft and open-grained. To fill these softer parts, or pores, and give to the whole an even, uniform surface, hard, and capable of a brilliant polish, is the object of the finishers' art. This hard, firm surface was formerly gained by the successive application of several coats of varnish, at least three preliminary coats being required to fill the pores; the inequalities were then reduced by fine sand or glass-paper, and several additional coats laid on, the last, after becoming thoroughly hard, being polished if desired. In this operation, however, a great quantity of varnish is absorbed by the open pores of the wood, and it is consequently so expensive that it is now seldom used. Recourse is therefore had to various plans to render the wood non-absorbent before applying varnishes, and certain compounds called fillers are largely used for this purpose.

THE PROCESSES.—Finishing, although comprehending many minute sub-divisions, may be divided into four principal processes, *i. e.*, FILLING, VARNISHING, RUBBING, and FLOWING, POLISHING, &c. Each of them are treated at length in their proper order, and

for full information regarding the successive operations, the learner must refer to these heads: here we shall give a general view of the entire operation without details. The process described is for fine work. First make the article to be finished quite clean and free from dust; then apply the proper filler with a brush; rub it well into the grain with excelsior or tow, rubbing across the grain when practicable, then clean all the surplus filler from the surface with rags; after filling, allow the article to stand for several hours, during which time the filler should become quite hard and dry. Before proceeding to apply the varnish, if necessary, make the surface of the filler quite smooth, with sand-paper; then apply a coat of varnish, allowing it to get quite hard; after the last coat of varnish, with fine sand-paper, sand-paper the surface sufficiently to make it entirely smooth and remove any lumps or irregularities. The number of coats required depends greatly upon the quality of filler used, regarding which some remarks will be found under the head of FILLERS. It is said that with some fillers one coat of varnish is sufficient, but this can scarcely be the case with fine work, as it is not possible for one coat of varnish to give sufficient body to rub; four, or possibly three coats are more desirable. When the last coat of varnish has been applied, the article is ready for "rubbing" with pumice stone, moistened with linseed oil and applied with a bit of hair-cloth or coarse rag. This is for the purpose of making the varnish perfectly smooth and preparing it for the polishing. After rubbing, if a dead finish is desired, the work is complete, but the body of the work is generally cleaned up with a little oil well rubbed in, which gives it a lustre, afterward rubbed with a cloth dampened with alcohol which removes the surplus oil from the surface. The veneered panels are either "flowed" or "polished," which processes are described under these heads.

## FILLING.

FILLERS.—These compounds play a very important part in the art of finishing, not only in the great economy of material and time required, but in producing a handsomer and more durable finish than possible, except at great cost, without them. Oil is sometimes used as a filler, but its use is not recommended;

applied directly to the wood its effect is to swell the fibres, or "raise the grain," which remains in that condition until the oil becomes entirely dry, or disappears. During all this time the fibres are gradually shrinking, and consequently moving or checking the varnish. The qualities essential to a good filler are: that it shall readily enter the porous portion of the wood, and shall very soon harden and render the wood impervious to the varnish, which should lie smoothly upon the surface, giving brilliancy and effect to the natural beauty of the wood; that it shall not raise the grain of the wood; that it shall not change the color of the wood. These conditions are satisfactorily filled by very few of the home-made fillers ordinarily used in shops, and while we give a number of receipts, our readers are advised that they will obtain better satisfaction, at less cost, by purchasing some of the patent fillers now coming into general use, of which we can recommend the very excellent fillers of the Bridgeport Wood Finishing Co., New York, and J. W. Kenna & Co., Chicago. In these fillers very little oil is used and a large amount of dryers, so that the wood becomes perfectly dry and hard in a few hours, preventing any swelling or shrinking of the fibres of the wood after the varnish is applied. The following fillers should be allowed to dry until quite hard. About eight hours are usually sufficient.

WALNUT FILLER—For Medium and Cheap Work.—10 lbs. bolted English whiting, 3 lbs. dry burnt umber, 4 lbs. Vandyke brown, 3 lbs. calcined plaster, ½ lb. Venetian red, 1 gal. boiled linseed oil, ½ gal. spirits turpentine, 1 quart black japan. Mix well and apply with brush; rub well with excelsior or tow, clean off with rags.

WALNUT FILLER.—For Imitation Wax-Finish—5 lbs. bolted whiting, 1 lb calcined plaster, 6 ounces calcined magnesia, 1 ounce dry burnt umber, 1 ounce French yellow, 1 quart raw linseed oil, 1 quart benzine spirits, ½ pint very thin white shellac. Mix well and apply with a brush. Rub well in and clean off with rags. Before using the above filling give the work one coat of white shellac. When dry, sand-paper down and apply the filler.

WALNUT FILLER.—For First-Class Work—3 lbs burnt umber ground in oil, 1 lb burnt sienna ground in oil, 1 quart spirits turpentine, 1 pint brown japan. Mix well and apply with a brush; sand-paper well; clean off with tow and rags. This gives a beautiful chocolate color to the wood.

FILLER FOR LIGHT WOODS.—5 lbs bolted English whiting, 3 lbs calcined plaster, ½ gallon raw linseed oil, 1 quart spirits turpentine, 1 quart brown Japan, and sufficient French yellow to tinge the white. Mix well and apply with a brush, rub in with excelsior or tow, and clean off with rags.

FILLER FOR LIGHT WOODS.—10 lbs bolted English whiting, 5 lbs. calcined plaster, 1 lb. corn starch, 3 ounces calcined magnesia, 1 gallon raw linseed oil, ½ gallon spirits turpentine, 1 quart brown japan, 2 ounces French yellow. Mix well and apply with brush, rub in with excelsior or tow, and clean off with rags.

FILLER FOR CHERRY.—5 lbs. bolted English whiting, 2 lbs. calcined plaster, 1½ ounces dry burnt sienna, 1 ounce Venetian red, 1 quart boiled linseed oil, 1 pint spirits turpentine, 1 pint brown japan. Mix well, rub in with excelsior or tow, and clean off with rags.

FILLER FOR OAK.—5 lbs. bolted English whiting, 2 lbs. calcined plaster, 1 ounce dry burnt sienna, ½ ounce dry French yellow, 1 quart raw linseed oil, 1 pint benzine spirits, ½ pint white shellac. Mix well, apply with brush, rub in with excelsior or tow, and clean off with rags.

FILLER FOR ROSEWOOD.—6 lbs. bolted English whiting, 2 lbs. calcined plaster, 1 lb. rose pink, 2 ounces Venetian red, ½ lb. Vandyke brown, ½ lb. brandon red, 1 gallon boiled linseed oil, ½ gallon spirits turpentine, 1 quart black japan. Mix well, apply with brush, rub in with excelsior or tow, and clean off with rags.

SIZING.—Size of different kinds is sometimes applied to the surface of wood to prevent absorption of the varnish. The kind of material used for the size is not important, the object being only to prevent absorption by a very thin coat of some substance not soluble in the varnish. For dark-colored woods, thin size,

made by reducing ordinary glue with water, is generally used; but for lighter-colored surfaces, a white size is used, which is prepared by boiling white kid or other leather, or parchment cuttings, in water for a few hours, or until it forms a thin jelly-like substance, which is reduced with water to a thin consistency, and used in a tepid state. Sometimes solutions of isinglass or tragacanth are employed in like manner.

Unlike the best fillers, sizes of any kind do not improve the finish, and are sometimes a positive detriment to it. They are used solely as an economy to reduce the quantity of the varnish needed, and their use is not recommended for the best work.

## APPLICATION OF VARNISHES.

Preliminary to applying the varnish the pores of the wood should be filled, according to instructions given in the preceding receipts. Sufficient time should be allowed for the filler to become perfectly hard, and if any lumps or inequalities remain, the surface should be made perfectly smooth by the use of glass paper. All dust, specks, etc., should be carefully removed by the brush made for that purpose, and the work is then ready for the varnish.

Varnishes of all kinds should be uniformly applied, in very thin coats, sparingly upon the edges and angles, where the varnish is liable to accumulate. In first placing the brush on the surface, it should be applied, not close to the edge, which would be liable to give too thick a coat at that part, but at a little distance from the edge, and the strokes of the brush should be directed towards the ends alternately, with steady rapid strokes, and only very moderate pressure. If the surface is small, the whole may be passed over in one operation, and then the brush may be returned to the edge at which work was begun, and it may be passed over the surface a second or a third time, to distribute the varnish uniformly, and work out the air bubbles. Sometimes, in small surfaces, the second series of strokes is made at right angles to the first, in order to distribute the varnish more equally, and the third is laid on in the same direction as the first; but unless this is done expeditiously and equally, it leaves cross-lines, which injure the appearance of the work.

Large surfaces are more difficult, as the varnish thickens too rapidly to allow of the entire surface being covered at one operation. They must therefore either be worked gradually from the one edge to the other, as in laying a tint of water-color, or the varnish must be applied upon separate portions successively; but it is rather difficult to join the portions without leaving irregular marks. It may, however, be successfully accomplished by thinning off the edge with light strokes of the brush made in the same direction as those on the finished portion; but some care is required to avoid disturbing the former coat while it is still soft and easily acted upon by the fresh varnish. In the same manner, in laying on a second or any subsequent coat of varnish, care must be taken not to continue the application of the brush sufficiently long to disturb the previous coat, which is speedily softened by the fresh varnish; and if the application of the brush were continued too long, the preceding coat would be disturbed, giving to the work an irregular or chilled appearance. A sufficient interval of time should be allowed between each coat for the perfect evaporation of the solvent, whether alcohol, turpentine or oil. The time required for this depends partly upon the kind of varnish employed, and partly on the state of the atmosphere. Under ordinary circumstances, spirit varnishes generally require from two to three hours between every coat; turpentine varnishes mostly require six or eight hours; and oil varnishes still longer—sometimes as much as twenty-four hours. But whatever time may be required, the second layer should never be added until the first is permanently hard; as when one layer is defended from the air by a second, its drying is almost stopped, and it remains soft and adhesive.

In applying spirit varnish, some little tact and expedition are necessary, in order to spread the varnish uniformly over the surface before it becomes too much thickened by evaporation, or it will exhibit a very irregular surface when finished. If the surface does not exceed a few inches square, no material difficulty is experienced, as the whole may be brushed over two or three times before the varnish becomes too thick; but surfaces containing two or three square feet present much greater difficulty, as it is neces-

sary that the varnish should be sufficiently worked with the brush to exclude all minute air-bubbles, which would spoil the appearance of the work, and can seldom be entirely removed until just before the varnish is becoming to thick to *flow* or spread uniformly after the brush has passed over it.

Turpentine and oil varnishes are applied in the same general manner as spirit varnishes: but as they dry more slowly, more time may be occupied in laying on the varnish, and therefore large surfaces may be more easily and uniformly covered; but the same precautions with respect to the dryness and warmth of the atmosphere are likewise desirable when it is wished to produce a brilliant surface.

Every precaution should also be taken to prevent any dust, or loose hairs from the brush, becoming accidentally attached to the varnish. Should this occur they will require to be carefully picked out with the point of a pen-knife and the surface of the varnish leveled with fine glass-paper, prior to the application of the next coat.

In using spirit varnishes, it is at all times of the first importance that particular attention should be given to doing the varnishing in a dry atmosphere; as all solutions of resins in alcohol are precipitated by the addition of water, not only as visible moisture, but even as vapor, which is at all times deposited by the atmosphere at a reduced temperature, in the form of invisible dew, and in this state it precipitates the resin in the thin coat of varnish, and gives the surface a milky, clouded or opaque appearanee, when the varnish is said to be chilled. But this effect is frequently produced even on a warm and apparently fine summer day, when the atmosphere happens to be more than usually charged with moisture. This is a frequent stumbling block in varnishing, and is only to be obviated by carrying on the process in a room sufficiently warmed to keep the moisture suspended in the air until the solvent has completely evaporated.

Not only should the room be sufficiently heated, but all currents of cold air must be avoided, as cold drafts if suffered to pass over the recently varnished surface, are quite sufficient to dull the varnish wherever they extend. When the varnish has been chilled,

the brilliancy and clearness may frequently be restored by giving the chilled surface another thin coat of varnish, taking care to avoid the causes of the former failure, and immediately holding the varnished surface at a moderate distance from a fire, so as to warm it sufficiently to partially re-dissolve the chilled coat; but care is necessary to avoid heating the varnish so much as to raise blisters, in which case no remedy would remain but to scrape off the entire coat.

The temperature generally preferred for the varnish room is about 72 deg. F., but a few degrees more or less are not important

Brushes for Varnishing.—For spirit varnishes, camels-hair pencils and brushes are used, the sizes of which vary from one-quarter to three-quarters of an inch diameter, according to the size of the work. When the surfaces are very large, flat camel-hair brushes are used; but from their comparative thinness they scarcely contain a sufficient quantity of varnish to preserve the brush uniformly charged in passing over a large surface. Turpentine and oil varnishes require less delicacy; and flat brushes, made of fine soft bristles, are generally used, or sometimes ordinary painting brushes are employed, but they are rather harsh, and, owing to the adhesion of the varnish, the hairs are apt to be loosened, and come out. Brushes should always be kept perfectly soft and clean, and therefore should never be laid aside when through work, without cleaning. For this purpose turpentine is best; the brushes can either be washed out quite clean in it, dried on a cloth, and laid aside, or the bristles can be partially immersed in turpentine and allowed to remain in it until wanted for use. Warm water and soap will also serve to clean the brushes. If, however the brushes are laid aside without being thoroughly cleaned, they will certainly be ruined by the hardening of the varnish.

Varnish Pan.—This can be procured at the color-shops. It is constructed of tin, with a false bottom; the interval between the two bottoms is filled with sand, which being heated over the fire keeps the varnish fluid, and it flows more readily from the brush. There is a tin handle to it, and the false bottom slopes from one end to the other, which gives sufficient depth when the varnish is

low. It should also have a wire fixed across the top to wipe the brush against. An ordinary preserve-jar is frequently used for containing the varnish, and is sufficiently suitable; but it also should have a wire or string stretched across the top, for reducing the quantity of varnish taken up by the brush. The quantity of varnish poured into the jar should be sufficient to nearly cover the hairs of the brush in order to keep it soft. Too small a quantity of varnish is liable to thicken rapidly by evaporation, which should at all times be prevented as far as possible, by keeping the vessel closely covered when not in actual use.

## RUBBING.

This part of the finishing process is that which gives to the varnish when laid upon the wood a degree of smoothness not otherwise attainable; for by the use of the brush alone, minute furrows and ridges are left upon the plastic surface of the varnish; and although good varnish possesses in itself a high gloss, the gloss is not nearly so agreeable to the eye as the brilliant polish, of which rubbing is the preliminary. The reduction of these ridges and furrows is accomplished by means of finely-powdered pumice-stone moistened with raw linseed oil, applied with a piece of hair-cloth or other coarse and fibrous material. For rubbing large flat surfaces the hair-cloth is sometimes folded over a block of convenient size, but this is not practicable for articles of small size or irregular shape. In rubbing considerable force must be used, but the stroke should be steady and as long as possible, and great care should be taken to rub the surface uniformly, as in case it is rubbed unevenly the varnish is liable to be worn away quite to the wood in some places, and the perfect smoothness that is the beauty of a good finish will thus be impossible. The edges especially are liable to be rubbed bare, and should be carefully treated. The crevices and hollows of carvings are rubbed by means of hard pointed sticks of various convenient sizes. The rubbing should be continued until the entire surface appears perfectly smooth and free from marks of any kind. The surplus pumice-stone and oil should all be carefully removed from the surface by means of rags, and the work may

then be cleaned up with a little sweet oil well rubbed in, and retouched with a cloth slightly dampened in alcohol, which serves to remove any remaining oil from the surface. If article has veneered panels, they are now ready for the final processes of "polishing" or "flowing."

## FLOWING AND POLISHING.

Flowing.—Flowing is the process of giving the work, after it has been properly prepared, a coat of varnish made expressly for that purpose, called flowing varnish. Veneered panels are usually finished this way. Some finishers, when the body-work is to be dead-finish with flowed panels, coat the panels with the same varnish—shellac or other—used for the body, and rub them with pumice-stone and oil; in fact, up to the point of flowing make no difference whatever in the treatment of the body-work and the panels. Such treatment is not recommended; whatever varnish is used for the body-work, the panels should be coated with two or three coats of the best rubbing varnish; oil should not be used for rubbing, as, if the surface is at all greasy, the subsequent coat of flowing varnish cannot be evenly laid, therefore water should be used with the pumice-stone for rubbing, in place of oil. After the rubbing is completed, wash off with a sponge and dry with a chamois skin. Let it stand for a day, and after freeing the work of all pumice-stone and dust, take it to the flowing-room, which should be clean, dry, and free from dust and all drafts of air, apply the varnish with a flat brush of suitable width made of badger or fitch hair; lay the varnish on smoothly and evenly, leaving no marks of the brush. The quicker the varnish is put on, and the less it is worked, the better it will look. Let it stand in the room until it is hard enough to handle. Upholstered work should not be flowed until it comes from the hands of the upholsterer and is ready for the ware-rooms.

Varnish Polishing.—This process is used when it is desired to give to the work a bright lustre, different from the natural gloss, and resulting from a perfectly smooth surface produced by rubbing. The previously applied coats of rubbing varnish having been rubbed down with pumice-stone and water, one or more coats of

polishing varnish is applied, rubbed down as before, and brought to a bright mirror-like surface with rotten-stone and water. Clean up with a little sweet oil, and afterward with a cloth dampened in alcohol.

## VARIETIES OF FINISH.

The processes of finishing having been described, it now remains to explain varieties of finishing in use; these are largely derived from the peculiar qualities of the different varnishes used, for full explanation of which see article VARNISHES. Polishing-varnishes, which are very hard and durable, are so called because their surface can be brought to a high luster by rubbing with the proper materials. Flowingor finishing-varnishes contain more oil than polishing-varnishes, dry more slowly, and are softer, but their peculiar qualities are brilliancy and durability, fitting them for work requiring a brilliant gloss, such as veneered panels. Rubbing-varnishes are those that dry sufficiently hard to admit of being rubbed to a smooth surface. Turpentine varnishes, being the cheapest variety are employed for cheap work, such as common chairs, bedsteads, &c. In general terms it may be said that the particular filler, stain or other preliminary application used exercises on important influence over the appearance of the finish, and that a great variety of combinations are possible. For different woods different fillers are used, the basis in most cases being the same, the difference being principally in the coloring material, and this is capable of great variation, to suit individual tastes. The same is true of stains, and under the head of STAINS and FILLERS will be found all needed information concerning the applications proper for different woods, with methods for using them. The varnish or other covering material used subsequently, will here be treated of separately.

DEAD-FINISH.—This term is applied to the finish produced by the reduction of any of the rubbing varnishes with powdered pumice-stone and raw linseed oil, (see RUBBING) the surface thus produced being left in the semi-lustrous state, by omitting the polishing process. It is now more used than any other for body work, shellac varnish being generally employed because of its

adaptation to the requirements of fine cabinet-work, and its properties of quick and hard drying. Copal, anime and amber varnishes are also used, but are slower drying. Veneered panels are usually "flowed" or "polished" when the body work is dead-finished. The number of coats required depends somewhat upon the quality of the filler, but usually three coats, and sometimes less are amply sufficient.

VARNISH FINISH.—For cheap work—One coat of filler or stain, followed by one coat of cheap turpentine varnish, without rubbing. In this class of work, the brilliancy of the gloss and covering qualities of the varnish are principally considered. The cheaper turpentine varnishes have a brilliant gloss, and dry very hard, but the gloss is not permanent, and after drying, the gum is very brittle and easily cracked and broken. The gum used is principally common resin.

WAX FINISH.—Mix together with heat, white wax and spirits of turpentine to the consistency of thick paste; when cold, apply it to the work with a rag; rub on heavily so as to fill the pores of the wood; remove all wax from the surface with a wooden scraper made in the shape of a carpenter's chisel; smooth off with a bunch of soft rags by rubbing hard and quick for a few minutes; finish with a little French polish applied with a cotton pad. (See FRENCH POLISH.) For table tops and all large flat surfaces, allow the wax to remain on and finish with a warm iron by passing it lightly and quickly over the work until the wax is made smooth and the surface is sufficiently polished. This is not considered a desirable finish, as it is not durable and water spots it very easily.

IMITATION WAX FINISH.—Use the light colored filler, named under head of FILLERS. Apply three coats of white shellac; rub down with pumice-stone and oil; clean up with brown japan and spirits of turpentine mixed. Varnish-polish the panels.

EBONY FINISH.—This finish is usually applied to cherry, or other light-colored woods having little grain. The ebony appearance is produced by the use of a stain, various receipts for which

will be found under the head of STAINS. White shellac is the varnish usually employed, but some prefer the best rubbing-varnishes. Whatever varnish is selected, it should be as near as possible transparent, as otherwise the color of the work will appear to be greenish or brown. Not more than three coats should be applied, as successive coats of the most transparent varnish, will cause an opaque or clouded appearance. Experience and care are required to successfully rub an ebonized article, as the varnish must be rubbed almost to the wood, and if rubbed too deep a portion of the stain is removed, leaving a spot. Especial care should be used in rubbing the angles.

EBONY FINISH.—Instead of staining the wood and applying successive coats of transparent rubbing-varnish, a black varnish (or more properly speaking, a lacker) is often laid upon the surface of the wood. This process possesses the advantage of being very speedy, not occupying more time than ordinary spirit-varnishing, but on the other hand, the rapid hardening of the gum prevents the varnish from entering into and becoming fixed in the pores, so that it lies in a thin, hard, but very brittle coating upon the surface, and is very readily broken and scaled off, leaving spots of the original color of the wood, that cannot be properly repaired. Shellac varnish is generally used for this finish and is prepared by adding to it, drop-black or perfectly pure lamp-black, containing no grease or other foreign substance, sufficient to make it perfectly black. Apply one or more coats of this to the work, and finish by adding the necessary number of coats of brown shellac, and rubbing in the usual way. This finish is employed when it is desired to engrave or carve a design through ebonized work, thus making the natural color of the wood appear in contrast to the black.

FRENCH-POLISHING.—This is a method of varnishing by rubbing the varnish upon the surface of the wood instead of applying it with brushes. When varnish is applied simply with a brush, a comparatively uneven surface results, rendering necessary the subsequent processes of rubbing and polishing, but by the method of French-polishing, a smooth and continuous surface, hard and not easily scratched, is secured.

All the polishes are applied very much in the same way and a general description will therefore be sufficient. To obtain a good polish with lac varnish on wood, the quantity applied must be very small, and must be rubbed continuously until dry. If the work be porous or coarse grained, it will be necessary to give it a coat of thin, clear size previous to commencing with the polish; when dry, the surface must be smoothed with fine glassor sand-paper. The size fills up the pores and saves the polish, and also saves considerable time in the operation.

Make a wad of cotton-batting, covered with several folds of very fine, soft linen cloth; put the wad or cushion to the mouth of the bottle containing the preparation (or polish) and shake it sufficiently to damp the cloth; then proceed to lightly rub the work with circular motion; as the rubber become drier, the pressure may be increased, but care should be taken not to press too heavily when the rubber contains much polish, as streakiness will result. The circular motion should be continued until the rubber becomes quite dry when more polish may be taken upon it and the rubbing renewed. It should be borne in mind that the rubber should never be raised directly from the work, but should be raised with a sweeping motion; also that it should never for a moment remain quiet upon the surface; and that its motion should be as even as possible; neglect of these precautions will produce a rough surface wherever the rubber remains quiet or is improperly removed. The circular rubbing must be continued until the surface appears perfectly smooth and the pores are no longer visible. Be very particular to keep the cloth covering of the wad clean and soft; it is desirable to use a clean portion each time it is dipped in the polish. It is quite likely that in about twelve hours after the above operation the surface of the work will be lustreless, and the grain plainly visible; in that case proceed over the work again until the grain is thoroughly filled. French-polishing is a process requiring particular care and skill, and considerable experience is necessary to produce good results.

The Ingredients.—Shellac, dissolved in alcohol is the basis of all French-polishes, and some finishers use thin shellac varnish without other admixture, slightly moistening the rubber with

linseed oil to prevent stickiness and make it work smoothly. There is a great variety of admixtures and diversity in the proportion of ingredients, but the differences are not material. We subjoin a number of receipts.

THE GENUINE FRENCH-POLISH.—To one point of spirits of wine add a quarter of an ounce of gum-copal, a quarter of an ounce of gum-Arabic, and one ounce of shellac.

Let the gums be well bruised, and sifted through a piece of muslin. Put the spirits and the gums together in a vessel that can be closely corked; place them near a warm stove, and frequently shake them. In two or three days they will be dissolved. Strain the mixture through a piece of muslin, and keep it tight corked for use.

FRENCH-POLISH.—Take one ounce each of mastic, sandarac, seedlac, shellac, gumlac, and gum-Arabic; reduce them to powder; and add a quarter of an ounce of virgin wax; put the whole into a bottle, with one quart of rectified spirits of wine; let it stand twelve hours, and it will be fit for use.

FRENCH-POLISH.—Put into a glass bottle one ounce of gumlac, two drachms of mastic in drops, four drachms of sandarac, three ounces of shellac, and half an ounce of gum dragon; reduce the whole to powder; add it to a piece of camphor the size of a nut, and pour on it eight ounces of rectified spirits of wine. Stop the bottle close, but take care, when the gums are dissolving, that it is not more than half full. Place near a warm stove until dissolved.

OTHER FRENCH-POLISH RECEIPTS.—1 pint naptha, 3½ ounces orange shellac, ½ ounce elima. Darken with red saunders wood

To one pint of spirits of wine, add half an ounce of gum shellac, half an ounce of seed lac, and a quarter of ounce of gum sandarac; submit the whole to a gentle heat, frequently shaking it, till the various gums are dissolved, when it is fit for use.

Shellac 6 ounces, naptha 1 quart, sandarac 1 ounce, benzoin ¾ ounce.

Three ounces shellac, ½ ounce of gum mastic pulverized, and

one pint of methylated spirits of wine added. Let it stand till dissolved.

Twelve ounces shellac, 2 ounces gum elima, 3 ounces gum copal, 1 gallon of spirits of wine; dissolve.

The following must be well mixed and dissolved:—Pale shellac 2¼ pounds, 3 ounces mastic, 3 ounces sandarac, 1 gallon spirits of wine. After the above is dissolved, add 1 pint copal varnish, 1 ¼ ounces shellac, ½ ounce gum juniper, ½ ounce benzoin, ½ pint of methylated alcohol.

An Improved Polish.—To a pint of spirits of wine add, in fine powder, one ounce seedlac, two drachms of gum guaiacum, two drachms of dragon's-blood, and two drachms of gum mastic; expose them, in a vessel stopped close, to a moderate heat for three hours, until you find the gums dissolved; strain the whole into a bottle for use, with a quarter of a gill of the best linseed oil, to be shaken up well with it.

This polish is more particularly intended for dark-coloured woods—for it is apt to give a tinge to light ones, as satin-wood, or air-wood, &c.,—owing to the admixture of the dragon's-blood, which gives it a red appearance.

Water-proof Polish.—Take a pint of spirits of wine, two ounces of gum benzoin, a quarter of an ounce of gum sandarac, and a quarter of an ounce of gum anime; these must be put into a stopped bottle, and placed either in a sand-bath or in hot water till dissolved; then strain the mixture, and, after adding about a quarter of a gill of the best clear poppy oil, shake it well up, and put it by for use.

Prepared Spirits.—This preparation is useful for finishing after any of the foregoing receipts, as it adds to the lustre and durability, as well as removes every defect, of the other polishes; and it gives the surface a most brilliant appearance.

Half a pint of the very best rectified spirits of wine, two drachms of shellac, and two drachms of gum benzoin. Put these ingredients into a bottle, and keep it in a warm place till the gum is all dissolved, shaking it frequently; when cold, add two tea-

spoonfuls of the best clear white poppy oil; shake them well together, and it is fit for use.

This preparation is used in the same manner as the foregoing polishes; but, in order to remove all dull places, you may increase the pressure in rubbing.

Polish for Turners' Work.—Dissolve 1 ounce of sandarach in ½ pint of spirits of wine; shave 1 ounce of beeswax, and dissolve it in a sufficient quantity of spirits of turpentine to make it into a paste, add the former mixture to it by degrees; then, with a woolen cloth, apply it to the work while it is in motion in the lathe, and polish it with a soft linen rag; it will appear as if highly varnished.

## STAINING.

Staining is the process of imparting to the surface of wood a color different from its natural one. It consists of two varieties, surface-staining and body-staining. In the former, as the name implies, the staining is effected by various compounds in the nature of pigments, laid upon the surface like paint, and forming a thin opaque coating, which does not, to any considerable degree affect the fibre of the wood. In the latter, the changes are chemical, the stain being usually applied as a thin wash, which, entering the pores of the wood, colors it to some depth below the surface. Staining requires no preliminary preparation, the stain being applied directly to the wood. As most stains raise the grain of the wood to a considerable extent, it is necessary before applying the varnish, to sand-paper the wood enough to render the grain quite smooth; this sometimes renders a second coat necessary, after which the sand-paper must be again applied.

Black Stain.—Boil ½ lb. of chip logwood in 2 quarts of water, add one oz. of pearl-ash, and apply it hot to the work with a brush; then take ½ lb. of logwood, boil it as before in 2 quarts of water, and add ½ oz. of verdigris and ½ oz. of copperas; strain it off, put in ½ lb. of rusty steel filings, and with this go over the work a second time.

A Good Black Stain.—1. Gall-nuts coarsely broken, 2

ounces, rain-water, 1 quart; boil until reduced one-half. 2. White vinegar, pint, iron filings, 2 ounces, antimony (powdered) 2 ounces, vitriol, 1 ounce, logwood a small handfull. Infuse in bottle eight days, tying the cork down. To stain a piece of wood, give the wood a coating of No. 1, which acts as a mordant; when nearly dry put on No. 2; let it dry quite, and then brush it over again with No. 2.

BLACK STAIN.—Boil the extract of logwood in water and to it add slowly a little of the yellow prussiate of potash. Brush on hot.

BLACK STAIN.—Boil 1 lb. logwood in 4 quarts of water; add a double handful of walnut-peel or shells, boil it up again, take out the chips, add a pint of the best vinegar and it will be fit for use; apply hot. This will be improved by applying over the first stain, a solution of one ounce of green copperas in a quart of water.

BROWN STAIN.—Boil 1 lb. of the brown pigment called Terre de Cassel with 4 quarts of water, until it is reduced one-third. Mix 2 ounces (Troy) of white potash with sufficient water to dissolve it, and mix with the Terre de Cassel. This stain must be applied with a brush, two or even three times, according to the depth of the shade required.

WALNUT STAIN.—Mix together by stirring, 1 quart spirits of turpentine, 1 pint asphaltum varnish, 1 pint of japan, 1 lb. dry burnt umber, 1 lb. dry Venetian red; apply with a brush. This stain is transparent, and allows the grain of the wood to show through.

WALNUT STAIN.—Boil 1½ ounces washing-soda, and ¼ ounce bichromate of potash, in 1 quart of water; add 2½ ounces Vandyke brown. This stain may be used either hot or cold.

WALNUT STAIN.—With a brush apply a thin solution of permanganate of potassa in water, until the desired color is produced, allowing each coat to dry before another is applied.

OAK STAIN.—Add to a quart of water, 2 ounces each of potash and pearl-ash. This is a very good stain, but it should be used

carefully as it blisters the hands and softens brushes. The stain may be made lighter by adding more water.

Oak Stains.—To darken the color of oak any of the following may be used:

Liquid ammonia laid on evenly with a rag or brush will deepen the color immediately, and it will not fade, this being an artificial production of result produced naturally by age.

Bichromate of potash, dissolved in cold water, and applied with a brush will produce a similar result.

A decoction of green walnut-shells will bring new oak to any shade or nearly black.

Rosewood Stain.—Mix in a bottle ¼ lb. of extract of logwood, one oz. salts of tartar and one pint of water; in another bottle, put one pound of old iron in small pieces and one pint of vinegar, which after standing twenty-four hours will be ready for use; make a hard, stiff brush with a piece of rattan sharpened at one end in a wedge shape, pounding it so as to separate the fibre. Mix in one pint of varnish, ¼ lb. of finely powdered rose pink. The materials are now ready, and the first thing in the process is to stain the wood with the logwood stain; give two coats of this, allowing the first to become nearly dry before applying the second; then dip the rattan brush in the vinegar and with it form the grain, after which give the work a coat of the varnish and rose-pink. There can be no definite directions given for graining, except to study the natural wood and imitate it as near as possible. With the above materials skillfully appiied, any common wood can be made to resemble rosewood so nearly that it will take a good judge to distinguish the difference.

Rosewood Stain.—Boil one pound of logwood in one gallon of water, add a double handful of walnut-shells, boil the whole again, strain the liquor and add to it one pint of the best vinegar. It is then ready for use. Apply it boiling hot, and when the wood is dry, form red veins in imitation of the grain of rosewood with a brush dipped in the following solution: Nitric acid, 1 pint; metallic tin, 1 ounce; sal ammoniac, 1 ounce. Mix and set aside to dissolve, occasionally shaking.

CHERRY STAIN.—Mix together, by stirring, one quart of spirits of turpentine, one pint of varnish, and one pound of dry burnt sienna; apply with a brush and after it has been on about five minutes wipe it off with rags. This stain takes about 12 hours to dry.

RED STAIN, for common work.—Archil will produce a very good stain of itself, when used cold, but if after one or two coats have been applied and suffered to get almost dry, it is brushed over with a hot solution of pearl-ash in water, it will improve the color.

MAHOGANY STAIN.—To darken mahogany, apply a weak solution of bichromate of potash in water. Apply successive coats allowing each to dry, until the required shade is secured.

SURFACE STAINS.—The following are for the most part used to apply to woods of inferior quality, to make them resemble choicer woods. The colors are all to be mixed with very thin glue size, laid on warm with a soft woolen material, and the wood wiped dry after application. All the colors used in staining should be well pulverized, and before use the liquid should be strained.

*Imitation Oak Stain.*—Equal parts burnt umber and brown ochre.

*Imitation Mahogany Stain.*—One part Venetian red and two parts yellow lead.

*Imitation Rosewood Stain.*—Venetian red, darkened with lampblack to required shade.

*Imitation Walnut Stain.*—Burnt umber and yellow ochre, mixed in proportions to give desired shade.

FINE CRIMSON STAIN.—Boil one pound of good Brazil dust in three quarts of water for an hour; strain it, and add half an ounce of cochineal: boil it again gently for half an hour, and it will be fit for use.

If you will have it more of a scarlet tint, boil half an ounce of saffron in a quart of water for an hour, and pass over the work previous to the red stain.

PURPLE STAIN.—To a pound of good chip logwood, put three

quarts of water; boil it well for an hour; then add four ounces of pearlash, and two ounces of indigo pounded.

FINE BLUE STAIN.—Into a pound of oil of vitriol (sulphuric acid) in a clean glass phial, put four ounces of indigo, and proceed as above directed in dyeing purple.

FINE GREEN STAIN.—To two pints of the strongest vinegar, add four ounces of the best verdigris pounded fine, half an ounce of sap green, and half an ounce of indigo.

Distilled vinegar, or verjuice, improves the color.

YELLOW STAIN.—Dissolve ¼ lb. turmeric in one pint alcohol; let it stand until the turmeric settles to the bottom.

YELLOW STAIN.—A small piece of aloes added to the varnish will have all the effect of a bright yellow stain.

TO BRIGHTEN STAINS.—Any of the stains named (except the surface stains) will be rendered much more brilliant by an application of the following: 1 ounce nitric acid, ½ teaspoonful muriatic acid, ¼ ounce grain tin, two ounces rain water. Mix in a bottle, at least two days before using, and keep the bottle well corked.

## DYEING WOOD.

DYEING wood is mostly applied for the purpose of veneers, while staining is more generally had recourse to give the desired color to the article after it has been manufactured. In the one case, the color should penetrate throughout, while in the latter the surface is all that is essential.

In dyeing pear-tree, holly, and beech, take the best black; but for most colors, holly is preferable. It is also best to have wood as young and as newly cut as possible. After the veneers are cut, they should be allowed to lie in a trough of water for four or five days before they are put into the copper; as the water, acting as a purgative to the wood, brings out an abundance of slimy matter, which must be removed, or the wood will never be a good color. After this purificatory process, they should be dried in the open air for at least twelve hours. They are then ready for the copper. By these simple means, the color will strike much quicker, and be

of a brighter hue. It would also add to the improvement of the colors, if, after the veneers have boiled a few hours, they are taken out, dried in the air, and again immersed in the coloring copper. Always dry veneers in the open air, for fire invariably injures the colors.

FINE BLACK DYE.—Put six pounds of chip logwood into the copper, with as many veneers as it will conveniently hold, without pressing too tight; fill it with water, and let it boil *slowly* for about three hours; then add half a pound of powdered verdigris, half a pound of copperas, and four ounces of bruised nut-galls; fill the copper up with vinegar as the water evaporates; let it boil gently two hours each day till the wood is dyed through.

FINE BLACK DYE.—Procure some liquor from a tanner's pit, or make a strong decoction of oak-bark, and to every gallon of the liquor add a quarter of a pound of green copperas, and mix them well together; put the liquor into the copper, and make it quite hot, but not boil; immerse the veneers in it, and let them remain for an hour; take them out, and expose them to the air till it has penetrated its substance; then add some logwood to the solution, place the veneers again in it, and let it simmer for two or three hours; let the whole cool gradually, dry the veneers in the shade, and they will be a very fine black.

FINE BLUE DYE.—Into a clean glass bottle put one pound of oil of vitriol, and four ounces of the best indigo pounded in a mortar, (take care to set the bottle in a basin or earthen glazed pan, as it will ferment;) then put the veneers into a copper or stone trough; fill it rather more than one-third with water, and add as much of the vitriol and indigo (stirring it about) as will make a fine blue, which may be known by trying it with a piece of white paper or wood. Let the veneers remain till the dye has struck through.

The color will be much improved, if the solution of indigo in vitriol be kept a few weeks before using it. The color will strike better, if the veneers are boiled in plain water till completely soaked through, and then allowed for a few hours to dry partially, previous to being immersed in the dye.

FINE BLUE DYE.—Throw pieces of quicklime into soft water; stir it well; when settled, strain or pour off the clear part; then to every gallon add ten or twelve ounces of the best turnsole; put the whole into the copper with the veneers, which should be of white holly, and prepared as usual by boiling in water; let them simmer gently till the color has sufficiently penetrated, but be careful not to let them boil in it, as it would injure the color.

A FINE YELLOW DYE.—Reduce four pounds of the root of barberry, by sawing, to dust, which put in a copper or brass trough; add four ounces of turmeric and four gallons of water, then put in as many white holly veneers as the liquor will cover; boil them together for three hours, often turning them; when cool, add two ounces of aquafortis and the dye will strike through much sooner.

A BRIGHT YELLOW DYE.—To every gallon of water, necessary to cover the veneers, add one pound of French berries; boil the veneers till the color has penetrated through; add to the infusion of the French berries, the liquid for brightening colors given on page 24, and let the veneers remain for two or three hours, and the color will be very bright.

BRIGHT GREEN DYE.—Proceed as in either of the previous receipts to produce a yellow; but instead of adding aquafortis or the brightening liquid, add as much vitriolated indigo (see page 22) as will produce the desired color.

GREEN DYE.—Dissolve four ounces of the best verdigris, and of sap-green and indigo half an ounce each, in three pints of the best vinegar; put in the veneers, and gently boil till the color has penetrated sufficiently.

The hue of the green may be varied by altering the proportion of the ingredients; and it is advised, unless wanted for a particular purpose, to leave out the sap-green, as it is a vegetable color very apt to change, or turn brown, when exposed to the air.

BRIGHT RED DYE.—To two pounds of genuine Brazil dust, add four gallons of water; put in as many veneers as the liquor will cover; boil them for three hours; then add two ounces of alum,

and two ounces of aquafortis, and keep it lukewarm until it has struck through.

RED DYE.—To every pound of logwood chips, add two gallons of water; put in the veneers, and boil as in the last; then add a sufficient quantity of the brightening liquid (see page 24) till you see the color to your mind; keep the whole as warm as the finger can be borne in it, till the color has sufficiently penetrated.

The logwood chips should be picked from all foreign substances, with which it generally abounds, as bark, dirt, etc.; and it is always best when fresh cut, which may be known by its appearing of a bright red color; for if stale, it will look brown, and not yield so much coloring matter.

PURPLE DYE.—To two pounds of chip logwood and half a pound of Brazil dust, add four gallons of water, and after putting in the veneers, boil them for at least three hours; then add six ounces of pearlash and two ounces of alum; let them boil for two or three hours every day, till the color has struck through.

The Brazil dust only contributes to make the purple of a more red cast; you may, therefore, omit it, if you require a deep bluish purple.

PURPLE DYE.—Boil two pounds of logwood, either in chips or powder, in four gallons of water, with the veneers; after boiling till the color is well struck in, add by degrees vitriolated indigo, (see page 22,) till the purple is of the shade required, which may be known by trying it with a piece of paper; let it then boil for one hour, and keep the liquid in a milk-warm state till the color has penetrated the veneer. This method, when properly managed, will produce a brilliant purple, not so likely to fade as the foregoing.

LIQUID FOR BRIGHTENING AND SETTING COLORS.—To every pint of strong aquafortis, add one ounce of grain tin, and a piece of sal-ammoniac of the size of a walnut; set it by to dissolve, shake the bottle round with the cork out, from time to time; in the course of two or three days it will be fit for use. This will be found an admirable liquid to add to any color, as it not only

brightens it, but renders it less likely to fade from exposure to the air.

ORANGE DYE.—Let the veneers be dyed, by either of the methods given in page 23, of a fine deep yellow, and while they are still wet and saturated with the dye, transfer them to the bright red dye as in page 23, till the color penetrates equally throughout.

SILVER GRAY DYE.—Expose to the weather in a cast-iron pot of six or eight gallons, old iron nails, hoops, etc., till covered with rust; add one gallon of vinegar, and two of water, boil all well for an hour; have the veneers ready, which must be air-wood, (not too dry,) put them in the copper used to dye black, and pour the iron liquor over them; add one pound of chip logwood, and two ounces of bruised nut-galls; then boil up another pot of the iron liquor to supply the copper with, keeping the veneers covered, and boiling two hours a day, till of the required color.

GRAY DYE.—Expose any quantity of old iron, or what is better, the borings of gun-barrels, etc., in any convenient vessel, and from time to to time sprinkle them with spirits of salt, (muriatic acid,) diluted in four times its quantity of water, till they are very thickly covered with rust; then to every six pounds add a gallon of water, in which has been dissolved two ounces of salt of tartar; lay the veneers in the copper, and cover them with this liquid: let it boil for two or three hours till well soaked, then to every gallon of liquor add a quarter of a pound of green copperas, and keep the whole at a moderate temperature till the dye has sufficiently penetrated.

## GILDING, SILVERING AND BRONZING.

GILDING, SILVERING AND BRONZING are processes of applying to previously prepared surfaces a thin layer of gold or silver leaf, or in bronzing, of a fine powder, prepared from various metals and intended to imitate the peculiar appearance of genuine bronze. The processes of gilding and silvering being identical, the description of one will suffice to explain the other.

GILDING.—Gold leaf, applied to articles of furniture as a means of decoration, is used in two ways; it is applied over an

ordinary varnish or other finish, in which case but little special preparation is necessary; or, as when used for picture frames, cornices, etc., it is applied to a specially prepared foundation, the basis of which is whiting, mixed with various other ingredients suggested by experience or fancy. In either case, the gold leaf is caused to adhere to the work, by size specially prepared for the purpose, receipts for which are given below; the size being first applied to the work, and when it has become of the right consistency, the gold is laid upon it. OIL-GILDING and BURNISH-GILDING are different methods used to obtain certain desired effects, the former principally for articles exposed to the weather, and for heightening the effect of incised carving or engraving, and the latter for picture-frames and articles having a specially-prepared foundation, whose entire surface is to be gilded. It is intended that the gold shall adhere to the work only in the places to which the size has been applied, but the smallest portion of oil or even a slight dampness may cause the gold to partially adhere to the adjoining surface, resulting in slightly-ragged edges; to prevent this, before applying the size to the desired design, the entire surface is covered with a thin film of some substance perfectly free from moisture, and easily removable by water, after completion of the process. Directions regarding this preliminary process are given under the caption: TO PREVENT GOLD ADHERING.

THE REQUISITES.—First, a sufficient quantity of leaf-gold, which is of two sorts—the deep gold, as it is called, and the pale gold. The former is the best; the latter very useful, and may occasionally be introduced for variety or effect.

Second, a gilder's cushion: an oblong piece of wood, covered with rough calf-skin, stuffed with flannel several times doubled, with a border of parchment, about four inches deep, at one end, to prevent the air blowing the leaves about when placed on the cushion.

Thirdly, a gilding-knife, with a straight and very smooth edge, to cut the gold.

Fourthly, several camel-hair pencils in sizes, and tips, made of a few long camel's hairs put between two cards, in the same man-

ner as hairs are put into tin cases for brushes, thus making a flat brush with a very few hairs.

Lastly, a burnisher, which is a crooked piece of agate set in a long wooden handle.

Sizes.—These are of two kinds: oil sizes are those which when applied, present an adhesive surface, requiring the immediate laying of the gold-leaf upon it; of this class is the oil-size commonly used in decorating furniture: water sizes are those that are allowed to become dry and hard when applied, and are rendered adhesive when the gold is to be laid, by brushing over with water; for burnish-gilding these are always employed, as oil-size does not dry sufficiently hard to permit of burnishing.

Oil-Size for Oil-Gilding.—Grind calcined red-ochre with the best and oldest drying-oil. When desired for use, add sufficient oil of turpentine to make it work freely.

Parchment-Size—For preparing Frames, etc.—To half a pound of parchment shavings, or cuttings of white leather, add three quarts of water, and boil it in a proper vessel till reduced to nearly half the quantity; then take it off the fire, and strain it through a sieve. Be careful, in the boiling, to keep it well stirred, and do not let burn.

Gold-Size for Burnish-Gilding.—Grind fine sal-ammoniac well with a muller and stone; scrape into it a little beef-suet, and grind all well together; after which, mix in with a pallet-knife a small proportion of parchment-size with a double proportion of water. When about to use, add parchment-size until it will just flow from the brush.

Gold-Size for Burnish-Gilding.—Grind a lump of tobacco-pipe clay into a very stiff paste with thin size; add a small quantity of ruddle and fine black lead, ground very fine, and temper the whole with a small piece of tallow. When ready to use, reduce with parchment-size until it will just flow from the brush.

Gold-Size for Burnish-Gilding.—Grind separately in water, 1 lb. Armenian bole, 2 ounces red lead, a sufficient quantity of black lead; mix, and re-grind with a small quantity of olive oil. Reduce with parchment-size to the proper consistency.

To Prevent Gold Adhering.—Either one of the following methods will prevent gold-leaf or bronze from adhering to the surface beyond the outlines of the sizing laid on to receive it:

1. Whiting used dry, and applied by means of a pounce bag.

2. Whiting mixed in water, and applied with a soft brush. When the water has evaporated, dust off the superfluous whiting with an ordinary paint duster. By this method a very thin coating of whiting remains, which is free from any grittiness. One advantage gained by the use of whiting thus applied is, it furnishes a whitish ground over which clear varnish or oil size may be distinctly seen as the striping progresses. After the leaf or bronze has been applied, the work must be carefully washed, so as to insure the removal of the whiting.

3. White of egg reduced with water, and applied with a piece of sponge.

4. A thin wash of starch water, either brushed on with a flat camel-hair brush, or applied with a soft sponge.

5. Take ball liquorice and water, a weak solution, and apply with a soft brush. This may be kept in a bottle ready for use at any time.

6. Cut a new potato in two, and rub over the part to be sized with the raw face exposed, allowing the juice to remain until dry.

It will be observed that any substance which interposes a film over the varnish, itself being free from tackiness and readily removed by water, will answer the purpose.

Oil Gilding.—Applying the Gold—If the wood to be gilded is finished with varnish or otherwise, no additional foundation is necessary upon which to lay the gold-leaf; if the wood is not finished, after it has been smoothed and dusted, give it one or two coats of parchment size, after it is perfectly dry and hard again smoothing the surface with fine sand-paper. That the gold may not adhere to any part of the work except where the size is hard, powder the surface lightly with whiting from a pounce-bag, which is a small bag made of material sufficiently loose to permit the powdered whiting to sift through as fine dust; if preferred, any of the preceding receipts for that purpose can be used instead. Remove the surplus whiting with the dusting-brush,

and the work is then ready for the size. Apply this with a sable or fit brush of the proper size, carefully observing not to make the outer lines of the design clear and sharp, that the work may not appear ragged. Let the size remain until it feels tacky, when the gold may be applied. This is the most difficult part of the operation, and experience is necessary before gold-leaf can be laid smoothly, without a wrinkle or a break. Turn a leaf of gold out of the book upon the cushion; breathe gently upon the center of the leaf and it will lay flat on the cushion; cut it to proper size by bringing the knife perpendicularly over it, and sawing it gently until divided. Take your tip (a brush used for the purpose) and after drawing it lightly over your hair to remove any particles or dust that may be upon it, breathe upon it gently which will dampen it sufficiently to cause the leaf of gold to adhere to it; lay the tip upon the leaf of gold and carefully transfer it to the work: blow upon it gently and it will straighten out and adhere. It may be rendered quite smooth by slightly dabbing it with a bit of cotton. In about an hour wash off the superfluous gold from the edges, with a sponge and water. If the article is to be exposed to the weather or much wear, the gilding may be varnished with copal varnish.

Burnish-Gilding.—As previously stated, this process requires a specially prepared foundation upon which to lay the gold, and as the preparation of this foundation is a distinct trade, the furniture dealer or cabinet-maker seldom finds it necessary to undertake it, the articles coming to his hand ready-prepared for gilding; but as in repairing picture-frames, cornices, mirror frames, etc., it frequently becomes necessary to renew the foundation, a comprehensive description of the whole process is given.

Preparing the Wood-work.—After smoothing and dusting the work, coat the frames in every part with boiling-hot parchment size, described on page 27; then mix a sufficient quantity of whiting with size to the consistency of thick cream, and with it by means of a brush, coat every part of the frame several times, permitting each coat to become perfectly dry before proceeding with the next. The wood will thus be covered with a

layer of hard whiting nearly or quite a sixteenth of an inch in thickness. The size must not be too thick and when mixed with the whiting should not be so hot as the preliminary coat of size.

Polishing.—When the prepared frames are quite dry, clean and polish them. To do this, wet a small piece at a time, and, with a smooth, fine piece of cloth, dipped in water, rub the part till all the bumps and inequalities are removed; and for those parts where the fingers will not enter, as the mouldings, &c., wind the wet cloth round a piece of wood, and by this means make the surface all smooth and even alike.

Where there is carved work, &c., it will sometimes be necessary to bring the mouldings to their original sharpness by means of chisels, gouges, &c., as the preparation will be apt to fill up all the finer parts of the work, which must be thus restored. It is sometimes the practice, after polishing, to go over the work once with fine yellow or Roman ochre; but this is rarely necessary.

Applying the Size.—Select the proper gold size from the receipts previously given; add parchment size until it will just flow from the brush; make it quite hot and apply it to the work with a very soft brush, taking care not to make the first coat too thick; let it dry and give two or three successive coats, after the last brushing it with a stiff brush to remove any inequalities. The work is then ready for the gold.

Laying the Gold.—The manipulation of the gold-leaf has been described under the heading Oil-Gilding. In the process now being described, the size used (being water-size, which as previously explained is permitted to become hard and dry after being applied) must be moistened to cause the gold-leaf to adhere to it. For this purpose, with a long-haired camel's-hair pencil, dipped in water, go over as much of the work as you intend the piece of gold to cover; then lay the gold upon it in the manner previously explained. Be sure that the part to which the gold is applied is sufficiently wet; indeed it must be floating or the gold will be apt to crack. Proceed in this manner a little at a time, and do not attempt to cover too much at once, until by experience you are able to handle the gold with freedom. In proceeding with the

work, if any flows or cracks appear, immediately apply a portion of gold sufficient to cover them. Sometimes when the gold does not appear to adhere sufficiently tight, it will be necessary to draw a pencil quite filled with water close to the edge of the gold, that the water may run underneath it and soften the size.

BURNISHING.—When the work is covered with gold, set it by to dry; there is a particular state or degree of dryness, known only by experience in which the moulding is in a fit state for burnishing; it will probably be ready to burnish in about eight or ten hours, but it will depend on the warmth of the room or state of the air.

When it is ready, those parts intended to be burnished must be dusted with a soft brush; then wiping the burnisher with a piece of soft wash-lether (quite dry) begin to burnish about an inch or two in length at a time, taking care not to bear too hard, but with a gentle and quick motion, applying the tool until all parts of the surface are equally bright.

MATTING OR DEAD GOLD.—Certain portions only of the work are burnished, according to the fancy, and the facility with which the burnishing-tool can be applied; the remaining parts are now to be deprived of their metallic luster, to make a more effective contrast with the burnishing. The parts thus treated are said to be matted or dead-gold. The process is as follows:

Grind some vermilion or yellow ochre very fine, and mix a very small portion either with the parchment size or with the white of an egg, and with a very soft brush lay it evenly on the parts to be dulled; if well done, it will add greatly to the beauty of the work. Previous to matting, the work must be well cleared of superfluous gold, by means of a soft brush.

FINISHING.—In elaborate works it is frequently impossible to lay gold-leaf into all the intricacies of an elaborate design, and the parts thus left bare must be finished by touching-up with a small brush charged with shell-gold, or gold-powder, mixed with gum-Arabic to the proper consistency. The following receipt describes the preparation of shell-gold:

SHELL-GOLD.—Take any quantity of leaf-gold and grind it

with a small portion of honey, to a fine powder; add a little gum-Arabic and sugar-candy, with a little water, and mix it well together; let it dry.

Silver Size.—Grind pipe-clay fine with a little black-lead and good soap, and add parchment-size as directed for gold-size.

Composition for Frame Ornaments.—The ornaments for gilded mirror-frames, etc., are usually moulded from some plastic substance that is somewhat tougher and more durable than the ordinary gilding foundation of whiting and size. The proper moulds being prepared they are thoroughly rubbed upon the inside with sweet oil, and the composition firmly pressed in; after removing the mould the cast may be dried by a gentle heat, or while still plastic it can be applied in its proper place and bent into any position. Following are receipts for composition:

Dissolve one pound of glue in one gallon of water. In another kettle boil together 2 lbs. of resin, 1 gill of Venice turpentine, and 1 pint of linseed oil; mix altogether in one kettle, and boil and stir till the water has evaporated. Turn the whole into a tub of finely rolled whiting, and work it till it is of the consistency of dough.

Boil 7 lbs. of best glue in 7 half-pints of water. Melt 3 lbs. of white resin in 3 pints of raw linseed oil. When the above has been well boiled put them into a large vessel and simmer them for half-an-hour, stirring the mixture and taking care that it does not boil over. The whole must then be turned into a box of whiting rolled and sifted, and mixed till it is of the consistency of dough.

To Manipulate Gold Leaf.—Get a piece of paper, thin enough to show shadow of gold-leaf through, slightly wax it, lay it on gold-leaf, the latter will then adhere, and can be easily worked, and will come off clean. The paper should be slightly larger than the gold-leaf, and the fingers passed over the paper to make the gold-leaf adhere.

Bronzing.—This is a process for imitating on metal, plaster, wood or other material, the peculiar appearance produced by

chemical action upon the surface of bronze metal. It is accomplished by spreading over the surface of the material to be ornamented a very thin coating of bronze-powder, which is caused to adhere either by applying it directly upon a coating of any of the sizes mentioned in the foregoing pages, or by mixing with a vehicle, such as gum-Arabic or transparent varnish. The latter is most desirable, as in the other case, being subject to the direct action of the atmosphere, the bronze-powder soon tarnishes. In ornamenting furniture, bronzing is generally employed to represent gilding, a variety of bronze called gold-bronze being used, which affords an excellent imitation but is not very lasting. It is usually applied after the completion of the other finishing processes, the ground-work being prepared in the manner described under OIL-GILDING, and the size likewise applied as there described. A small wad of cotton-batting is then dipped in the bronze and passed gently over the sized portions, causing the bronze to adhere. In the other method—that of applying the bronze by means of a vehicle—the preliminaries of whiting the ground and sizing are not necessary, a small quantity of bronze being simply mixed with the vehicle employed to such a degree of fluidity that it will flow easily, and in that condition applied with a fine brush. Many preparations are used as vehicles, such as transparent varnish thinned with turpentine, gum-Arabic dissolved in water, and gold-size reduced with parchment-size. There are a variety of colors in bronze-powders, and to produce the best effect the size or vehicle should be of a color similar to that of the bronze used; in gold-size the coloring pigment is ochre, and in its place, for green-bronze, red-bronze, or blue-bronze, may be employed respectively verditer, vermillion or Prussian blue, a very small quantity being sufficient. In bronzing on painted work the ground should be as nearly as possible the color of the bronze to be applied.

## GRAINING AND COLOR WORK.

GRAINING.—This is a variety of painting by which the grain, color or texture of different woods is imitated. Considerable experience is necessary to produce satisfactory results, the mixing

of the colors to the right shade, and the manipulation of the simple tools in a manner to faithfully imitate the grain and markings of the wood, requiring a high degree of skill. Of course these remarks do not apply to that variety of graining in which only a variegated surface is aimed at, and no pretentions made to a close imitation of any wood: that simple process requires neither skill nor judgment.

The peculiar effect of graining is produced by the use of several shades of paint, the lightest being first applied: the design being drawn by wiping off a certain portion of the second and third or darker coats, while still in a moist condition, the intermediate and light shades below are partially uncovered, the contrast of the different shades resembling the effect of the more prominent markings of the grain of wood. This resemblance is heightened by processes called "stippling" and "blending" which, as indicated by their titles, blend the shades and soften the lines.

The tools required are a stippling-brush, which is a brush with hairs about six or eight inches long; a kalsominer's brush will answer the purpose; a blending-brush, which is made from camel's or badger's-hair and is very soft; two or three steel combs of different sizes; a rubber like a pencil-rubber, about the size of the thumb and rounded off at the ends, to convenient size.

The Process of Graining.—If there are any knots or sappy places in the article, they should be covered with one or two coats of glue-size or parchment-size to prevent them showing through. The work is then ready for the paint, three different shades being necessary. These are called the ground color; the stippling color; and the graining or oil color, and they are laid in the order named. An infinite number of combinations of colors are possible, obtained by the use of various coloring pigments in the different coats, and no two grainers agree as to the precise proportion of the ingredients to be used in imitating different woods; we give a number of receipts for graining grounds, and also for mixing various colors; the learner can vary the proportions to suit his taste as experience dictates, and to suit the work in hand. The ground color is used to represent the lightest part of the grain of the wood, the stippling color the intermediate shades, and the graining

color the darkest parts; a close study of natural woods will therefore be necessary to determine the color and depth of each.

The proper ground being selected (see GRAINING GROUNDS) apply one or more coats — as many as are necessary to thoroughly cover the surface. As soon as the ground color is hard the stippling coat may be applied. This is prepared by mixing the dry pigments without oil, with either very thin gum-water, stale beer, or vinegar containing a small portion of dissolved fish-glue. The pigments to be used, as stated above are usually about the same as those used for the ground color, but of different proportions to produce a deeper shade. Apply the stippling color, and before it dries, beat it softly with the side of the stippler, the long elastic hairs of which, disturbing the surface of the laid coat, cause the lighter coat beneath to become indistinctly visible, and produce the effect of the pores of wood. Next apply the graining color; as soon as it is laid, take the rubber and with it wipe out the larger veins to be shown, after each stroke wiping the paint from the rubber with a cloth held in the other hand for that purpose. Some grainers use a small sponge for veining, and others a small piece of cloth over the thumb, but the rubber is probably the most convenient. When the veins have been put in, to imitate as closely as possible the markings of natural wood, the various steel combs are brought into use, and the edges of the veins, and sometime other portions of the work, combed with them, to soften the abrupt transition from the dark to the lighter shades. The blender is also now brought into use, and wherever the work may require it, the colors are still more softened and blended by its soft hairs. When too much color has been removed in veining, or when a certain figure, such as a knot, is required, the work is touched up with a fine brush, and again softened with the blender. When dry a coat of transparent varnish should be applied, having considerable oil to render it durable, as grained work is frequently washed.

Ready-made graining colors are recommended as best and cheapest

GRAINING GROUNDS.—Subjoined are a few recipes for mixing ground colors.

*Light Wainscot Oak.*—White lead and yellow ochre, mixed to the required tint. Some grainers prefer a perfectly white ground for very light oak for inside work, but it is always difficult for any but a perfect master of the art to proceed satisfactorily on a white ground, and the work, when completed, is apt to have a chalky effect, even though a dark varnish be applied.

*A Darker Wainscot Oak.*—Mix white lead, middle chrome, and yellow ochre.

*Dark Oak.*—White lead, Venetian red, and yellow ochre.

*Very Dark Oak.*—White lead, raw sienna, burnt umber, and Venetian red; or burnt and raw sienna, white lead, and burnt umber.

These colors, mixed in different proportions, will produce a multiplicity of tints suitable to receive the graining color, their strength being of course determined by the greater or lesser preponderance of white lead.

*Mahogany Grounds.*—There are various notions extant amongst grainers as to the best grounds for mahogany graining, some preferring a ground of a deep yellow cast, while others choose one approaching a bright red. The reds and yellows used are Venetian red, red lead, vermillion, raw sienna, burnt sienna, orange chrome, middle chrome, etc. These colors can be mixed to the tint required, an addition of white lead being made in each case, as the positive reds and yellows are too powerful unless diluted in turn by white. Venetian red, orange chrome, and white lead are the colors most generally used, and these three will, according to their predominance or subordination, make such a variety of tints that the most fastidious grainer need have no misgiving that the result will not come up to his expectation, if he exercise due discretion in mixing the colors.

*Rosewood Ground.*—Venetian red, vermillion, and white lead. A little scarlet lake is added for superior work, but this of course is too expensive for general use. Some painters mix with the reds a small quantity of raw sienna or chrome yellow.

*Bird's Eye Maple.*—White lead alone is preferred by some grainers, but the majority of painters use a little yellow ochre to kill the rawness of the white, and this is much the better plan to adopt.

Beginners are apt to make the ground too yellow, a mistake that should be avoided at the outset, as the varnish which has subsequently to be coated over the work will give transparency, and add a pale creamy tone, whereas, if the ground be too yellow, the result will be heaviness.

Graining Grounds.—The best and cheapest and most convenient simple material, for making grounds for light oak, maple, ash, and chestnut, is pure raw Italian sienna, tinted with pure white lead, not the so-called sienna which is sold by most paint dealers under that name, but the genuine article, which can be, and should be obtained even at some cost and trouble, the said article being one of the most useful and indispensable articles in the paint shop. For maple ground, of course the smallest quantity is required, it being necessary only to change the white to the faintest suggestion of straw color. For ash, the ground should be a little darker. For light oak, more of the sienna will be required, while for chestnut a decidedly yellowish tone is wanted. Care must be taken not to make the grounds too dark. Rather in the other extreme, for the reason, that there is a remedy for a too light ground, in the application of a greater quantity of graining color, as also in the glazing coat; while a ground too dark, cannot be made lighter. For dark oak, burnt Italian sienna with white will produce a far better ground than any other *single* color. The same caution must be observed, however, in obtaining this color as recommended in the case of the raw Italian sienna. The domestic so-called siennas will not prove substitutes for the genuine Italian pigments. The ground for black walnut may be the same as for light oak with the addition of a little burnt sienna and black.

Mixing Colors.—The primary colors are those that cannot be compounded from other colors, being pure in themselves; they are three in number—red, blue and yellow; and from these three all others are compounded. From each of the three primaries in combination with either of the others, is derived certain groups of colors, termed secondaries and tertiaries, with the variations of tints and shades. All of these are regularly classified and their combinations may be learned according to rule, with great pleas-

ure to the learner, and an almost limitless adittion to his resources. A standard authority on these subjects is "Chevreul on Color," which may be obtained at any book-store. The combinations named below will enable the painter to mix many colors that he may require.

*Cream Color.*—Chrome yellow, the best Venetian red, and white lead.

*Pearl Grey.*—White lead with equal portions of Prussian blue and lampblack. The blue must be used very cautiously, as it is a powerful color.

*Fawn Color.*—Burnt sienna, ground very fine, mixed with white lead.

*Fawn Color.*—White lead, stone ochre, and vermillion.

*Buff.*—This is a mixture of pale chrome yellow and white lead, tinged with a little Venetian red.

*Straw.*—A mixture of pale chrome yellow and white lead.

*Drab.*—Raw or burnt umber and white lead, with a little Venetian red.

*Drab.*—White lead with a little Prussian blue and yellow ochre.

*Drab.*—White lead with a little yellow ochre and lampblack.

*Drab.*—White lead with a little chrome green.

*Purple.*—White lead, Prussian blue, and vermillion.

*Purple.*—Prussian blue, vermillion, and rose madder or crimson lake.

*Violet.*—Vermillion, French ultramarine, a small portion of black, and white lead.

*French Grey.*—White lead and Prussian blue, tinged with vermillion; and for the last coat, if cost is no object, substitute rose madder or lake for vermillion.

*Silver.*—White lead, indigo, and a small portion of black, as the shade may require.

*Dark Chestnut.*—Mix light red and black. Use red ochre when required to lighten the color.

*Salmon.*—White lead tinged with the best Venetian red.

*Peach Blossom.*—White lead tinged with orpiment.

*Lead.*—This is a mixture of vegetable black and white lead.

*Dark Lead Color.*—White, black, and indigo.

*Chocolate*—Vegetable black and Venetian red.

*Light Yellow.*—Lemon yellow and white lead.

*Light Yellow.*—Chrome yellow, white lead, and red lead.

*Light Yellow.*—Raw sienna, mixed with white lead. If the color is required of a warmer cast, add a little burnt sienna.

*Stone Color.*—Yellow ochre, burnt umber, and white lead.

*Stone Color.*—Raw sienna, burnt umber, and white lead.

*Stone Color.*—White lead, burnt umber, yellow ochre, and a little Venetian red.

*Olive Green.*—Prussian blue, chrome yellow, and burnt umber.

*Olive Green.*—Vegetable black, chrome yellow, and a small portion of burnt umber.

*Grass Green.*—Several shades of grass green may be made by mixing Prussian blue and chrome yellow.

*Carnation.*—Lake and white lead.

*Imitation of Gold.*—Mix white lead, chrome yellow, and burnt sienna, until the proper shade is obtained.

COLORS FOR OUTLINES OF ORNAMENTS.—In decorative designs into which different colors enter, attention to the following rules will greatly increase the beauty of the work; tue rules are based on scientific principles.

*First:* Any color on a gold back-ground should be outlined with a darker shade of its own color.

*Second:* A gold ornament on a colored back.ground may always be outlined with black, provided the back-ground is not too dark; in that case outline with a light color.

*Third:* A colored ornament on a ground of complementary color should be outlined with a lighter tint of its own color, or a neutral color.

*Fourth:* If the ornament and ground are in shades of the same color, and the ornament is darker than the ground, the outline should be still darker; if the ornament is lighter than the ground, no outline is required.

TONES.—Often called shades, signify colors mixed with either white or black.

TINTS are colors mixed with white.

SHADES are colors mixed with black.

TEMPERA is a mixture of powdered colors with gum-water.

DISTEMPER is a mixture of powdered colors with size.

COLOR HARMONY IN GRAINED WORK.—It is unquestionably essential that every painter should know what plain colors and tints may be used in harmonious contrasts or combinations with the various painted imitations of fancy woods. Green is entirely unobjectionable; indeed, it forms a pleasing contrast with light oak, satinwood, bird's-eye maple, chestnut and ash—but discords with mahogany, black walnut and rosewood. Blue is entirely harmonious with all these latter. Black harmonizes with all the woods as does white; but white with the lighter colored ones is feeble and wanting. All the woods harmonize with each each other except black walnut with mahogany and rosewood. Gold is good with all, but the contrast with the light colored ones is not so brilliant as with the dark-toned woods. The bright colors in these, deaden the usually dull tones of the black walnut and detract from it thereby; whereas the contrast with the latter-named wood, with the light colored ones, improves and brightens all the contrasting tints and shades. Light and dark oak are best shown by themselves in contrast with each other, being too coarse in the grain to exhibit with good effect in combination with maple and satinwood. In color harmony, generally, white and black harmonize with all colors but green. Gold is good with every color, shade and tint, but especially rich with green, black, purple, carmine and blue.

CHINESE WHITE.—The following is recommended as the best way to prepare Chinese white:—Dissolve as much Roman alum in as small a quantity of hot water as is barely sufficient, and then mix it with two ounces and a half of honey. Set this mixture to evaporate to dryness in an earthen vessel, over a gentle fire. It will then appear like a spongy sort of coal, which being removed from the fire, must be pounded, and the powder placed in shallow crucibles or cupels, so that it may lie very thinly on them. Expose these to a strong red heat for an hour; after this, the powder must be pounded again, and being replaced in the cupels it must be

exposed anew to a strong heat, and to a free current of air for an hour longer. Being then removed from the fire, it is reduced upon a porphyry slab to an exceedingly fine powder of an intense whiteness. It may be mixed with gum-water, in the same manner as other paints are usually treated, and it is not apt, like white lead to turn to a dusty hue.

Mixing White Lead.—To mix the white lead it should be placed in a can or pot, and an admixture of oil and turpentine being at hand, a small quantity should be poured over the white lead, and the whole stirred about with a stiff palette-knife or a stopping-knife, till the dilutent has become thoroughly incorporated with the white lead.

The mixture may now be stained to the required tint. For this purpose the staining color should be ground in oil, and added cautiously to the diluted white lead, some colors staining much more powerfully than others. The staining color should never be added in a powdered or dry state.

Varnish Green, for Venetian Blinds, &c.—The work must first be painted once or twice with a light lead color; when hard, grind some dry white lead in spirits of turpentine; afterwards take about one-third in bulk in verdigris, or navy green, which has been ground stiff in oil; then mix them both together, and add a little common oak varnish, sufficient only to bind the color. When this has been applied it will become hard in about fifteen minutes. Add more varnish to give a good gloss. Then go over the work a second time, and, if required, a third time. Thus you will have a beautiful green with a high polish. It possesses a very drying quality, enabling the work to be completed in a few hours. The tint may be varied according to taste, by substituting different greens; and if a bright grass green is required, add a little Dutch pink to the mixture. This color is best used warm, as it gives the varnish an uniform appearance.

# VARNISHES.

VARNISHES are solutions of the various resins, commonly called gums, in either oil, turpentine, or alcohol. The gums principally applied are amber, anime, copal, lac, sandarac, mastic, damar and common resin. The varnishes are all applied to the surfaces of the woods, metals, or other materials, while in the fluid state, and the solvent is afterwards evaporated, leaving a thin glossy coat of the different resins as a defence from the action of the atmosphere, or from slight friction.

Sometimes the resins are used separately; at other times two or more are combined according to the qualities required in the varnish.

## THE GUMS AND THEIR QUALITIES.

AMBER.—The durability of the varnishes is of course mainly dependent upon the comparative insolubility of the resins; their hardness, toughness, and permanence of color. In these respects amber excels all other resins used for varnishes; it resists the action of all ordinary solvents, and can only be dissolved for making varnish by fusion at a high temperature; it is hard and moderately tough, and its color is but little influenced by the atmosphere; but, unless very carefully selected, it is too yellow for delicate works of light colors. Amber is, however, but little used in making varnishes, principally on account of its high price, but partly because the varnish dries slowly, and does not attain its full hardness for many weeks.

ANIME is nearly as insoluble and hard as amber, and the best is of a very pale color; but it is not nearly so tough as amber. The varnishes made from anime dry quickly, but are very liable to crack, and the color becomes deeper by exposure to light and air.

Anime is, however, extensively used in making oil varnishes, and most of these called copal varnishes contain a considerable proportion of anime, which is substituted principally on account of its quick drying qualities.

Copal is next in durability to amber; when very carefully selected it is almost colorless, and becomes rather lighter by exposure; it is more easily dissolved by heat than either amber or anime, and although softer than these resins, is too hard to be scratched by the nail. Copal is, therefore, a most excellent material for varnish, and numerous attempts have been made to employ it as the basis of a spirit varnish, but hitherto with only partial success. Pure alcohol has little effect on copal; with the addition of a small quantity of camphor, the greater portion of the copal is dissolved, but the camphor impairs the durability of the varnish. Copal may be perfectly dissolved by ether, but this spirit evaporates too rapidly to allow of the varnish being uniformly applied. The essential oils of spruce and lavender have been occasionally employed as solvents of copal, but not with sufficient success to warrant its general adoption in spirit varnishes.

Oil Varnishes.—Amber, anime, and copal are usually dissolved for making varnish by fusing the gum, and adding linseed-oil heated nearly to the boiling point. They are then amalgamated by stirring and boiling, and the varnish is reduced to the required degree of fluidity by the addition of oil of turpentine. They constitute the more important of what are called oil varnishes, are the most durable of all, possess considerable brilliancy, and are sufficiently hard to bear polishing. They are therefore employed for works of the best quality, that are exposed to the weather or to much friction; as coaches, house-decorations, and japanning.

Spirit-Varnishes.—Lac and sandarac are more soluble than the above resins, and are generally dissolved in spirits of wine; but sometimes the pyroligneous spirit, commonly known as vegetable naphtha, is employed as a cheaper substitute. These resins constitute the basis of what are called spirit varnishes, and are employed principally for delicate objects not exposed to the weather, such as cabinet and painted works.

Lac is much harder and more durable than sandarac, and is the basis of most lackers for hard wood and metal, and also of French polish. Of the three varieties, stick-lac, seed-lac, and shell-lac, the latter is the most free from color, and the most soluble; it is therefore almost exclusively used in making varnishes and lackers; but the palest shell-lac contains a considerable quantity of coloring matter, that renders it inadmissible for varnishing works of a light color. In addition, shell-lac also contains a small quantity of wax, and other matters, that are only imperfectly soluble in spirits of wine, and therefore give a cloudy appearance to the varnish, but which is not of great importance in varnishing dark-colored works, and may be in great measure avoided by making the solution without heat, and allowing the more insoluble portions time to be precipitated.

Sandarac is softer and less brilliant than shell-lac, but is much lighter in color; it is therefore used for making a pale varnish for light colored woods, and other works for which the dark color of shell-lac would be unsuited. When hardness is of greater importance than paleness, a portion of shell-lac is added; but when paleness and brilliancy are required, a small quantity of mastic is added. When the varnish is required to be polished, Venice turpentine is added to give sufficient thickness or body.

Mastic is softer than any of the resins previously mentioned, and is dissolved either in spirits of wine or oil of turpentine; the latter is more generally used on account of its cheapness. With either of these solvents mastic makes a varnish of a very pale color, that is brilliant, works easily, and flows better on the surface to which it is applied than most other varnishes. It is also tolerable flexible, and may be easily removed by friction with the hand; it is therefore much used for varnishing paintings, and other delicate works.

Damar is easily dissolved in oil of turpentine, and when carefully selected is almost colorless; it makes a softer varnish than mastic. The two combined, however, form an almost colorless varnish, moderately hard and flexible, and well suited for maps and similar purposes.

COMMON RESIN is generally dissolved either in turpentine or linseed-oil with heat. Varnish made with resin is hard and brittle, but brilliant, and is principally employed to make cheap varnishes for common purposes in house-painting, toys, and cabinet work. It is also added to other varnishes in order to improve their brilliancy, but it should be added in small quantities only, as a large proportion of resin renders the varnishes brittle.

## THE SOLVENTS.

LINSEED-OIL is extensively employed as a vehicle for the harder resins, to which it imparts softness and toughness, but causes the varnish to dry slowly; and unless the oil is of the purest and palest quality, well clarified, and carefully combined with the resin, without excess of heat, it materially darkens the color of the varnish when first made, and it is also liable to become darker by age after it is applied. Linseed-oil intended for the best varnishes is clarified by gradually heating it in a copper pot, so as to bring it nearly to the boiling point in about two hours; it is then skimmed and simmered for about three hours longer, when dried magnesia, in the proportion of about one-quarter of an ounce to every gallon of oil, is gradually introduced by stirring; the oil is then boiled for about another hour, and afterwards suffered to cool very gradually. It is then removed into leaden or tin cisterns, and allowed to stand for at least three months, during which the magnesia combines with the impurities of the oil and carries them to the bottom, and the clarified oil is taken from the top of the cistern as it is required without disturbing the lower portion, and the settlings are reserved for black paint. a pale drying oil may also be made as above, by substituting for the magnesia white copperas and sugar of lead, in the proportions of two ounces of each to every gallon of oil.

Linseed-oil when rendered drying, by boiling and the addition of litharge and red lead, is sometimes used alone as a cheap extempore varnish. In boiling linseed-oil, it is heated gradually to bring it to the boiling point in about two hours; it is then skimmed, and well-dried litharge and red lead, in the proportion of about three ounces of each to every gallon of oil, are slowly

sprinkled in, and the whole is boiled and gently stirred for about three hours, or until it ceases to throw up any scum, or emit much smoke. It is then frequently tested by dipping the end of a feather into it, and when the end of the feather is burned off, or curls up briskly, the oil is considered to be sufficiently boiled, and is allowed to cool very slowly, during which the principal portion of the driers settle to the bottom. The oil is afterwards deposited in leaden cisterns screened from the sun and air. When the oil is required to be as pale as possible, dried white lead, sugar of lead, and white copperas are employed instead of the litharge and red lead.

Oil of Turpentine is employed as a vehicle for most of the resins, the oil varnishes being generally thinned with hot oil of turpentine. Mastic, damar, and common resin are generally made into varnishes by dissolving them in oil of turpentine alone, either cold or with very moderate warmth. Varnishes made with turpentine only, dry quicker than those made with oil, and are paler colored, but not so tough and durable. Turpentine varnishes hold an intermediate position between oil and spirit varnishes, and are employed principally on account of their cheapness and flexibility. Turpentine varies considerably in quality, and is greatly improved by age; that intended for varnish should be of the best quality, clear and limpid, and be kept for many months, or even years, before it is used; and when employed alone, as for mastic varnish, care should be taken that it is not passed through an oily measure, as is frequently the case in procuring small quantities.

Alcohol, or Spirits of Wine, is employed for dissolving sandarac and shell-lac, to make the white and brown hard spirit varnishes, and lacker for hard wood or brass, and also French polish. The varnishes made with alcohol dry much quicker, harder, and more brilliant than those made with turpentine; but if the spirit contains more than a minute proportion of water, it will scarcely dissolve the resins, and when the varnish is applied, a very slight degree of moisture in the atmosphere will cause the resins to be precipitated from the solution, giving the varnish a dull, cloudy, or milky appearance. It is therefore of the first

importance, in making spirit varnishes, to procure the alcohol as pure as possible.

Ordinary spirits of wine, however, always contains a considerable proportion of water, and are commonly tested for varnish purposes by saturating a slip of writing-paper with the spirit, which is then ignited. If the flame of the spirit communicates to the paper, and the whole is burned, the spirit is considered to be sufficiently good; but if, as frequently happens, the paper should be so far saturated with the water remaining from the evaporation of the spirit as to prevent its burning, the spirit is rejected as unfit for varnish purposes.

Nearly pure alcohol may be obtained from ordinary spirits of wine, by adding about one-third its weight of well-dried carbonate of potash, agitating the bottle and then allowing it to stand for ten or twelve hours, during which time the potash will absorb much of the water from the spirit and fall to the bottom; the spirit may then be poured off, and fresh alkali added, and the process repeated until the potash remains quite dry; the alcohol is then to be freed from the small portion of potash which it holds in solution by distillation in a water-bath.

Naphtha, or the spirit procured by distillation from pyroligneous acid, and commonly known as vegetable or wood naphtha, is frequently employed instead of spirits of wine for making cheap varnishes. It dissolves the resins more readily than ordinary spirit of wine, but the varnish is less brilliant, and the smell of the naphtha is very offensive. It is therefore never employed for the best works.

Preparation of Oil Varnishes.—The preparation of oil varnishes requires the application of considerable heat, and owing to this and the highly inflammable nature of the materials, the process is attended with considerable risk of setting the building on fire. The process should, therefore, always be conducted in detatched buildings constructed expressly for the purpose. Owing partly to the necessity for this precaution, and the circumstance that oil varnishes are greatly improved by being kept in leaden cisterns for some months before they are used, the preparation of

oil varnish is carried on almost exclusively as a separate manufacture, the details of which are greatly varied, and are mostly kept secret.

The copper pot employed to make the varnish is called a *gum-pot*, and measures about two feet nine inches in height, and nine and a half inches diameter externally. The bottom is hammered out of a single piece of copper, and fashioned like a hat without a brim; it is about nine inches deep, and three-eighths of an inch in thickness. The upper part of the pot is formed as a cylinder, of sheet copper, about two feet two inches in height, and of sufficient diameter to slip about two inches over the upper edge of the bottom piece, to which it is firmly rivited. A wide flange of copper, to support the pot, is also fixed just beneath the lower edge of the cylinder, and a strong iron hoop is fixed a little above the line of the rivets, to serve for the attachment of the horizontal handle, which is made as a nearly straight rod, one inch square, flattened at the end, and two feet eight inches long.

The *stirrer* is a copper rod about three-quarters of an inch diameter, and three feet six inches long, flattened at the one end to one and a half inch in breadth for about eight inches in length, and fitted at the opposite end with a short wooden handle.

The ladle, which should contain about two quarts, is also of copper beaten out of the solid, and riveted to a handle of the same metal, three feet six inches long, and fitted with a wooden handle like the stirrer.

The copper *jack*, for pouring hot oil into the gum-pot, is made in the form of a pitcher, with a large handle and a wide spout; it contains two gallons. The brass or copper sieve, for straining the varnish, is about nine inches diameter, and contains sixty meshes to the inch. The copper funnel, for straining the boiling varnish, is large enough to receive the sieve, and should be well made with lapped seams, as solder would be melted with the heat.

The tin pouring-pot, to hold three gallons, is formed exactly like a garden watering-pot, only smaller at the spout, and without any rose. This is never to be used for any purpose except pouring oil of turpentine into the varnish.

A small broom, termed a "swish," used for washing out the

gum-pot every time after use, is made from cuttings of cane tied to a small handle like a hearth-broom; the head is five inches long, and five inches round. This should be washed in turpentine, and kept very clean.

A three-footed iron trevet, with a circular top, is employed to support the gum-pot. The feet of the trevet are about sixteen inches in height, and spread wider at the bottom than the top, which is made of such a size that the pot will fit easily into it, the flange resting on the top.

An ash-bed should be prepared near the fire, upon which to place the gum-pot when the varnish is ready for mixing, or the heat is becoming too great. This is prepared by sifting some dry ashes through a fine sieve, to make a smooth layer about one and a half inch thick, and a little larger than the bottom of the gum-pot.

Place the trevet in a hollow in a field, yard, garden, or out-house, where there can be no danger from fire, raise a temporary fireplace round the trevet with loose bricks, after the same manner that plumbers make their furnaces; then make up a good fire with either coke, coal, or wood charcoal, which is far preferable; let the fire burn to a good strong heat, set on the gum-pot with three pounds of gum copal; observe that if the fire surround the gum-pot any higher inside than the gum, it is in great danger of taking fire. As soon as the gum begins to fuse and steam, put in the copper stirrer, and keep cutting, dividing, and stirring the gum to assist its fusion; and if it feels lumpy and not fluid, and rises to the middle of the pot, lift it from the fire and set it on the ash-bed, and keep stirring until it goes down (in the mean time let the fire be kept briskly up); then set on the gum-pot again, and keep stirring until the gum appears fluid like oil, which is to be known by lifting up the stirrer so far as to see the blade. Observe, that if the gum does not appear quite fluid as oil, carry it to the ash-bed whenever it rises to the middle of the pot, and stir it down again (keep up a brisk fire), put on the pot and keep stirring until the gum rises above the blade of the stirrer; call out to the assistant, "be ready!" He is then, with both hands, to lay hold of the copper-pouring jack, charged with (one gallon) clarified oil, and

lean the spout about one inch and a half over the edge of the gum-pot. Let him keep himself firm, steady, and collected, and not flinch, spill, or pour the oil, which would perhaps set all on fire. Observe, when the gum rises within five inches of the pot-mouth, call out, "pour!" The assistant is then to pour in the oil very slowly until towards the last, the maker stirring during the pouring.

If the fire at this time is strong and regular, in about eight or ten minutes the gum and oil will concentrate and become quite clear; this is to be tested by taking a piece of broken window-glass in the left hand, and with the right lifting up the stirrer and dropping a portion of the varnish on it; if it appears clear and transparent, the oil and gum are become concentrated or joined together. It is now to be farther boiled until it will string between the finger and thumb; this is known by once every minute dropping a portion on the glass and taking a little between the forefinger and thumb. If it is boiled enough it will stick strong, and string out into fine filaments, like bird-lime; but when not boiled enough, it is soft, thick, and greasy without being stringy. The moment it is boiled enough, carry it from the fire to the ash-bed, where let it remain from fifteen to twenty minutes, or until it is cold enough to be mixed; have at hand a sufficient quantity of oil of turpentine to fill the pouring-pot (two gallons); begin and pour out with a small stream, gradually increasing it, and if the varnish rises rapidly in the pot, keep stirring it constantly at the surface with the stirrer to break the bubbles, taking care not to let the stirrer touch the bottom of the pot, for if it should, the oil of turpentine would be in part converted into vapor, and the varnish would run over the pot in a moment; therefore, during the mixing, keep constantly stirring as well as pouring in at the same time. Have also a copper ladle at hand, and if it should so far rise as to be unmanageable, let the assistant take the ladle and cool it down with it, lifting up one ladleful after another, and letting it fall into the pot. As soon as the varnish is mixed, put the varnish sieve in the copper funnel placed in the carrying tin, and strain the varnish immediately; empty it into open-mouthed jars, tins, or cisterns, there let it remain and settle, and the longer it

remains the better it will become. Recollect when it is taken out, not to disturb or raise up the bottoms.

Instead of the ash-bed, a circle of loose bricks four courses high may be erected to support the gum-pot. The bricks are to be laid so that when the gum-pot is set within, it will rest securely by its flange with the bottom about six inches from the ground. Upon this brick-stand set the pot every time there is occasion to carry it from the fire. Near the stand an iron trevet may be placed, upon which to turn the gum-pot every time after it is washed out, as, by so doing, it will always be kept clean, and cool gradually, for by cooling rapidly copper oxidizes very quickly. Near the trevet have the swish broom and also a large wide tin jack or other vessel to receive the washings. Have also at hand a copper ladle, and a tin bottle with turpentine, for washing with when wanted.

The moment the maker has emptied the gum-pot, throw into it half a gallon of turpentine, and with the swish immediately wash it from top to bottom, and instantly empty it into the tin jack. Afterwards, with a large piece of woolen rag dipped in pumice powder, wash and polish every part of the inside of the pot, performing the same operation on the ladle and stirrer; rinse them with the turpentine washings, and at last rinse them altogether with clean turpentine, which also put to the washings, wipe dry, with a clean soft rag, the pot, ladle, stirrer, and funnel, and lay the sieve so as to be completely covered with turpentine, which will always keep it from gumming up

Eight pounds of copal takes in general from sixteen to twenty minutes in fusing, from the beginning till it gets clear like oil; but the time depends very much on the heat of the fire and the attention of the operator. During the first twelve minutes while the gum is fusing the assistant must look to the oil, which is to be heated at a separate fire in a copper pot, large enough to contain double the quantity required. The oil should be brought to a smart simmer, for it ought neither to be too hot nor too cold, but in appearance beginning to boil, which the assistant is strictly to observe; and, when ready, call to the maker; then immediately each take hold of one handle of the boiling-pot and carry it to the

ash-bed, the maker instantly returning to the gum-pot, while the assistant ladles the hot oil into the copper-pouring jack, bringing it and placing it at the back of the gum-pot until wanted.

A thick piece of old carpet, free from holes, should be kept at hand in case the gum-pot should take fire; should this happen, let the assistant throw the piece of carpet quickly over the blazing pot, holding it down all round the edges; and in a few minutes the fire will be smothered.

After the oil has been mixed with the gum, a brisk strong fire should be kept up, until a scum or froth rises and covers all the surface of the contents, when it will begin to rise rapidly. Observe when it rises about two-thirds the height of the pot, carry it from the fire, and set it on the ash-bed, or brick-stand, stir it down again; and if driers are to be added, scatter in a few by a little at a time; keep stirring, and if the frothy head goes down, put the pot on the fire, and introduce *gradually* the remainder of the driers, always carrying the pot to the ash-bed when the froth rises about two-thirds the height of the pot. In general, if the fire be good, all the time a pot requires to boil from the time of the oil being poured in, is about three and a half or four hours; but *time* is no criterion for a beginner to judge by, as it may vary according to the weather, the quality of the ingredients, or the heat of the fire; therefore, about the third hour of boiling, try it on a bit of glass, and keep boiling it until it feels strong and stringy between the fingers, as before mentioned.

The foregoing directions are, with very little differences, to be observed in making all sorts of copal varnishes, excepting the quantities of oil, gum, &c., a few of which will be now added.

Copal Varnish for Fine Paintings,&c.—Fuse eight pounds of the very cleanest pale African gum copal, and, when completely run fluid, pour in two gallons of hot oil; let it boil until it will string very strong; and in about fifteen minutes, or while it is yet very hot, pour in three gallons of turpentine, got from the top of a cistern. Perhaps during the mixing a considerable quantity of the turpentine will escape, but the varnish will be so much the brighter, transparent, and fluid; and will work freer, dry quickly,

and be very solid and durable when dry. After the varnish has been strained, if it is found too thick, before it is quite cold, heat as much turpentine and mix with it as will bring it to a proper consistence.

ARTIST'S VIRGIN COPAL.—From a select parcel of scraped African gum copal, before it is broken, pick out the very fine transparent pieces, which appear round and pale, like drops of crystal; break these very small; dry them in the sun, or by a very gentle fire. Afterwards, when cool, bruise or pound them into a coarse powder; then procure some broken bottles or flint-glass, and boil the same in soft water and soda; then bruise it into a coarse powder, like the gum; boil it a second time, and strain the water from it, washing it with three or four waters, that it may be perfectly clean and free from grease or any impurity; dry it before the fire, or upon a plate set in an oven. When thoroughly dry, mix two pounds of the powdered glass with three pounds of the powdered copal; after mixing them well, put them into the gum-pot, and fuse the gum; keep stirring all the time; the glass will prevent the gum from adhering together, so that a very moderate fire will cause the gum to fuse. When it appears sufficiently run, have ready three quarts of clarified oil, very hot, to pour in. Afterwards, let it boil until it strings freely between the fingers. Begin and mix it rather hotter than if it were body varnish, for, as there is but a small quantity, it will be sooner cold; pour in five quarts of old turpentine, strain it immediately, and pour it into an open jar, or large glass bottle; expose it to the air and light, but keep it both from the sun and moisture until it is of a sufficient age for use. This is the finest copal varnish for fine paintings.

CABINET VARNISH.—Fuse seven pounds of very fine African gumcopal; when well dissolved, pour in half a gallon of pale clarified oil; and when clear mix with it three gallons of turpentine; afterwards strain it, and put it aside for use. This, if properly boiled, will dry in ten minutes; but if too strongly boiled, will not mix at all with the turpentine; and *sometimes*, when boiled with the turpentine will mix, and yet refuse to amalgamate with any other varnish less boiled than itself; therefore, it requires a nicety which

is only to be learned from practice. This varnish is very apt to chill all other oil varnishes to which it may be added, and is principally employed as a quick drying varnish for the occasional use of japanners, cabinet, and coach-painters. Cabinet varnish is, however, more generally made with anime than copal.

BEST BODY COPAL VARNISH FOR POLISHING.—Fuse eight pounds of fine African gum copal, add two gallons of clarified oil; boil it very slowly for four or five hours, until quite stringy, and mix it off with three and a half gallons of turpentine.

The above varnishes being made of the finest copal without driers are the palest and best of the copal varnishes, possessing great fluidity and pliability, but they are rather slow in drying and retain for months so much softness that they will not polish well, until they give out a moisture and become hard; after which they are very durable. When paleness is not of primary importance a second quality of gum is used, and when the varnish is required to dry quickly, sugar of lead or white copperas are introduced as driers, either singly or combined, in the proportion of from half a pound to one pound to each of the quantities above quoted, but driers are always injurious to the color, brilliancy, and durability of varnishes. When a varnish is required that will dry quick and hard without driers, gum anime is substituted for the copal, but it is less durable and becomes darker by age. Frequently, anime varnish is mixed with copal varnish by the maker while both are hot, in different proportions according to the quality required; one pot of the anime to two of copal being used for a moderately quick drying body varnish of good quality; and two pots of anime to one of copal for a quicker drying body varnish of common quality.

CARRIAGE VARNISH is made much the same as common body varnish, except that to eight pounds of gum of second quality about two and a half gallons of oil and five and a half gallons of turpentine are used with driers. This varnish is boiled until very stringy, and is used for the wheels and under framework of coaches and other objects not requiring to be polished; it is intermediate in quality between body varnish and the following.

Wainscoat Varnish consists of eight pounds of second quality gum anime, three gallons of clarified oil, one-quarter pound of litharge, one-quarter pound of dried sugar of lead, one-quarter pound of copperas, well boiled until it strings very strong, mixed with five and a half gallons of turpentine. This varnish dries quickly, and is principally used for house-painting and japanning. When a darker varnish is required, as for mahogany, a small portion of gold size may be mixed with it.

Pale Amber Varnish.—Fuse six pounds of fine-picked very pale transparent amber in the gum-pot, and pour in two gallons of hot clarified oil. Boil it until it strings very strong. Mix with four gallons of turpentine. This will be as fine as body copal, will work very free, and flow well upon any work it is applied to; it dries slowly, but becomes very hard, and is the most durable of all varnishes. It is very excellent to mix in copal varnishes, to give to them a hard and durable quality. Amber varnish is, however, but little used, on account of its expense.

In making all the above varnishes, it should be observed that the more minutely the gum is fused, the greater the quantity and the stronger the produce. The more regular and longer the boiling of the oil and gum together is continued, the more fluid or free the varnish will extend on whatever it is applied. When the mixture of oil and gum is too suddenly brought to string by too strong a heat, the varnish requires more than its just proportion of turpentine to thin it, whereby its oily and gummy quality is reduced, which renders it less durable; neither will it flow so well in laying on. The greater proportion of oil there is used in varnishes, the less they are liable to crack, because the tougher and softer they are. Increase the proportion of gum in varnishes, the thicker the stratum required, and the firmer they will set, and the quicker they will dry.

All body varnishes, or those intended to be polished, should have one and a half pounds of gum to each gallon of varnish when it is strained off and cold. All carriage or wainscot varnishes or those not intended to be polished, should have full one pound of gum to each gallon. But the quantity of gum required to bring it to its proper consistence, depends very much upon the

degree of boiling it has undergone; therefore, when the gum and oil have not been strongly boiled, the varnish requires less turpentine to thin it, and when boiled stronger than usual, a larger proportion of turpentine is required; if the mixing of the varnish with the turpentine is commenced too soon, and the pot is not sufficiently cool, there may be considerable loss by evaporation.

Copal varnishes should be made at least three months before they are required for use, and the longer they are kept the better they become; but when it is necessary to use the varnishes before they are of sufficient age, they should be left thicker than usual.

Preparation of Spirit and Turpentine Varnishes.—In the preparation of spirit and turpentine varnishes, scarcely any apparatus is required; as, generally speaking, the process is almost limited to mixing the resins and solvent together, and agitating the whole until the resin is thoroughly dissolved. Heat is not generally necessary, and although frequently resorted to in order to facilitate the dissolution of the resins, in most instances only a moderate degree of warmth is required; consequently the preparation of spirit and turpentine varnishes is far more manageable than that of oil varnishes, and entails much less risk of accident.

The resins should be thoroughly free from moisture, and are generally broken into small pieces, in order that they may be dissolved more quickly, and all impurities are carefully picked out; after which the finest and clearest pieces are generally selected and set aside for making small quantities of varnish of a superior quality. Sometimes, with the view of expediting the dissolution of the resins, they are finely powdered before they are added to the solvent; but, in this case, it is necessary that the agitation should be maintained from the time the resin is added until it is thoroughly dissolved, otherwise it is liable to agglutinate into one mass, that is afterwards very difficult of solution.

In making turpentine varnishes without heat, in quantities of ten or twelve gallons, the resin and turpentine are generally introduced into a large can with a wide mouth, and agitated by stirring with a stout stick; a number of wooden pegs or nails are mostly driven into the stick, near the lower end, to increase its effect.

Spirit varnishes are generally made in smaller quantities; and,

to prevent the evaporation of the spirit, the mouth of the vessel is mostly closed and the vessel itself is agitated. In making quantities of four to eight gallons, the resin and solvent are sometimes introduced into a small cask capable of containing about double the quantity, and mounted to revolve on central bearings at the ends. The cask is made to revolve either with continuous motion by a winch-handle, or with an alternating motion by means of a cord passed around the barrel and terminating in a cross-handle, which the operator pulls to give motion to the barrel in the one direction, and the momentum of which suffices to coil up the cord ready for the following pull, which causes the barrel to revolve in the opposite direction, and so on continually.

Quantities of varnish not exceeding two or three gallons, are generally agitated in a tin can, rolled backwards and forwards upon a bench covered with an old carpet or a sack; but whatever method is adopted for the agitation, it should be continued, without intermission, until the resin is sufficiently dissolved to prevent the risk of its becoming agglutinated; the time required for which depends upon the solubility of the resin and the strength of the spirit, but is commonly from three to four hours. The farther agitation for the thorough solution of the resin may be either continuous or intermittent, according to convenience, but it should not be abandoned until the solution is perfect; and when it is judged to be complete, the varnish is poured into another vessel for examination; and if any of the resin is not perfectly dissolved, the whole is returned to the vessel for farther agitation. When the resin is all dissolved, the varnish is allowed to stand for a few hours, that any impurities may settle to the bottom, and the clear varnish is lastly strained through muslin or lawn into bottles, and allowed to stand for a few days before use.

Very small quantities of varnish are generally made in glass bottles, large enough to contain about one-third more than the quantity introduced, and they are shaken up at frequent intervals; but although, from the small bulk of the resin, it cannot agglutinate into so insoluble a mass as when larger quantities are made, still, when the agitation is intermitted, several days are frequently required before the resins are entirely dissolved, as the

solution depends more upon the amount of agitation than the length of time the resins are submitted to the action of the solvent.

Sometimes, with the view of preventing the agglutination and facilitating the dissolution of the resins, coarsely-pounded glass is introduced with the resin and solvent; in this case the glass should be thoroughly washed and dried, and afterwards sifted, to exclude all the smaller particles, which, from their lightness, would have little effect in preventing the aggregation of the resin, and would be more troublesome to separate from the varnish.

When heat is employed in making spirit varnishes, the lowest temperature should be used that will suffice to dissolve the resins, as otherwise there is risk of losing a considerable portion of the alcohol by evaporation, thereby reducing the strength of the spirit; the varnish is also liable to be made of a darker color by excess of heat, and those containing shell-lac are less clear and hard when made with heat than when made quite cold, as the heated spirit dissolves the greater portion of the wax contained in the shell-lac, and which becomes disseminated throughout the mass; but when the solution is made without heat, the principal portion of the wax and other impurities remains undissolved at the bottom.

In making large quantities of spirit varnish with heat, a still and worm are sometimes employed, in order to prevent loss by evaporation; the still is heated by a steam or water-bath, and the resins and solvent are agitated by a stirring-rod passing through a stuffing-box in the head of the still. Quantities of two or three gallons are generally made in a tin can, which is dipped at frequent intervals into hot water, and agitated between every dip by rolling; but in this case it is necessary to loosen the cork every time it is immersed in the hot water, in order to allow the vapor of the spirit to escape; otherwise the cork would be driven out with great force, and some of the spirit might be thrown on the fire with great risk of serious accident. Glass bottles, although convenient from their transparency, should never be employed for making varnish with heat, as they are liable to break from the alternations of temperature. They are, however, often used for

making small quantities, and in this case the safer practice is to heat the water only in a moderate degree, and to allow of the continuous escape of the vapor through a small notch cut lengthwise in the cork, and which may be closed by the thumb when the bottle is shaken. There is, however, always some little risk of accident in making spirit varnishes near an open fire, when much heat is employed; and a water or sand bath, placed on the top of a stove, so as to be heated only in a moderate degree, will be generally found to afford sufficient warmth, and is, perhaps, the most safe and convenient arrangement for occasional purposes.

Shell-lac never requires more than a very moderate warmth to dissolve it, and the solution is frequently made in stone bottles, placed near a fire and shaken occasionally. When it is required to be very clear, as for metal lacker, it should be passed through filtering-paper, before it is bottled.

It need scarcely be observed, that all the utensils employed in making spirit varnishes should be perfectly clean and dry, as the least moisture or even a damp atmosphere is liable to deteriorate the quality of the varnish.

Best White Hard Spirit Varnish, to bear polishing, is made by adding two pounds of the best picked gum sandarac to one gallon of spirit of wine; they are then shaken up without intermission for about four hours, or until the gum is quite dissolved; eighteen ounces of Venice turpentine is then moderately warmed, in a water-bath, to make it fluid, and poured into the varnish to give it a body; the whole is then well agitated for about one hour, and afterwards strained and put into bottles, which should be kept well corked, to prevent the evaporation of the spirit; after standing about a week, the varnish is fit for use. This varnish may be made sufficiently pale to be used on white work, when the clearest and palest pieces of the gum are carefully selected. When the work does not require to be polished, the proportion of Venice turpentine may be reduced one-half.

White Hard Varnish is also made with three and a half pounds of gum sandarac to one gallon of spirit of wine, and when they are dissolved one pint of pale turpentine varnish is added.

and the whole are well shaken until thoroughly mixed. Another white hard varnish is made with two pounds of gum sandarac, one pound of gum mastic, and one gallon of spirit of wine.

White Spirit Varnish, for violins, is made with two pounds of mastic to one gallon of spirit of wine, and one pint of turpentine varnish. This may be made either in the same manner as the white hard varnish, or the ingredients may all be mixed together in a tin can, placed in a warm situation near a fire, and shaken occasionally until dissolved.

Brown Hard Spirit Varnish is made in the same manner as white hard varnish, but shell-lac is generally used instead of sandarac. Thus a very excellent brown hard spirit varnish that will bear polishing is made with two pounds of shell-lac to one gallon of spirit of wine; and, after they are amalgamated, eighteen ounces of Venice turpentine are warmed and added, exactly as described for the best white hard varnish. Another very good brown hard spirit varnish consists of two pounds of shell lac, one pound of sandarac, and two ounces of mastic dissolved in one gallon of spirit of wine. A lighter-colored varnish is made with two pounds of sandarac, one pound of shell-lac, and one gallon of spirit. After the resins are dissolved, one pint of turpentine varnish is added, and the whole is well mixed by agitation.

Hard-wood Lacker is made, like the brown hard varnish, with two pounds of shell-lac to one gallon of spirit of wine, but without turpentine. Another hard-wood lacker is made with one pound of seed-lac and one pound of white resin, dissolved in one gallon of spirit of wine.

French Polish is made in a great variety of ways; but the simplest, and probably the best, consists of one and a half pound of shell-lac dissolved in one gallon of spirit of wine without heat. Copal, sandarac, mastic, and gum Arabic, are frequently used in making French polish, partly with the view of making the polish of a lighter color, and partly to please the fancy of the polisher; the proportions of the different gums are varied almost infinitely, but with little advantage. A polish that is by some considered to

be very good is made with twelve ounces of shell-lac, six ounces of gum Arabic, and three ounces of copal to one gallon of spirit of wine. When a dark-colored polish is required, half a pound of benzoin is sometimes added to one pound of shell-lac dissolved in one gallon of spirit, or four ounces of guaiacum are added to one and a half pound of shell-lac; at other times the polish is colored to the required tint with dragon's-blood.

The shell-lac alone makes the hardest and most durable polish, and it is a frequent practice to make the polish rather thicker in the first instance than it is required for use, as it may be readily thinned by the addition of spirit. But if it should be made too thin originally, it would require to be thickened by dissolving a farther portion of shell-lac. With the view of avoiding any risk of the polish being made too thin in the first instance, the proportion of shell-lac is frequently made two pounds to the gallon of spirit. Other resins are sometimes added, with the view of making the polish tougher. Thus, sometimes, the polish is made with one and a half pound of shell-lac, four ounces of seed-lac, four ounces of sandarac, and two ounce of mastic to the gallon of spirit; at other times the proportions are two pounds of shell-lac and four ounces of thus to the gallon of spirit.

Bleached Shellac.—When a lighter-colored lac varnish, or polish is required than can be made with the palest ordinary shell-lac, the bleached lac, sold under the name of white lac, may be employed with advantage. The varnish made with the white lac is at first almost colorless, but becomes darker by exposure to the light.

Various modes have been adopted for bleaching lac varnish. One process is as follows: Six ounces of shell-lac, coarsely pounded, are to be dissolved by gentle heat in a pint of spirit of wine; to this is to be added a bleaching liquor, made by dissolving purified carbonate of potash in water, and then impregnating it with chlorine gas till the silica precipitates, and the solution becomes slightly colored. Of the above bleaching liquor, add one or two ounces to the spirituous solution of lac, and stir the whole well together; effervescence takes place, and, when this ceases, add more of the bleaching liquor, and thus proceed till the

color of the mixture has become pale. A second bleaching liquid is now to be added, made by diluting muriatic acid with thrice its weight of water, and dropping into it pulverized red lead, till the last added portions do not become white. Of this acid bleaching liquor, small quantities at a time are to be added to the half-bleached lac solution, allowing the effervescence, which takes place on each addition, to cease before a fresh portion is poured in. This is to be continued till the lac, now white, separates from the liquor. The supernatant fluid is now to be poured away, and the lac is to be well washed in repeated waters, and finally wrung as dry as possible in a cloth.

Another process: Dissolve five ounces of shell-lac in a quart of rectified spirit of wine; boil for a few minutes with ten ounces of well-burned and recently-heated animal charcoal, when a small quantity of the solution should be drawn off and filtered; if not colorless, a little more charcoal must be added. When all color is removed, press the liquor through silk, as linen absorbs more varnish, and afterwards filter it through fine blotting-paper.

Dr. Hare's process, published in the *Franklin Journal*, is as follows: Dissolve, in an iron kettle, one part of pearlash in eight parts of water; add one part of shell or seed-lac, and heat the whole to ebullition. When the lac is dissolved, cool the solution, and impregnate it with chlorine gas till the lac is all precipitated. The precipitate is white, but the color deepens by washing and consolidation; dissolved in alcohol, lac, bleached by the process above mentioned, yields a varnish which is as free from color as any copal varnish.

A nearly colorless varnish may also be made by dissolving the lac, as in Dr. Hare's process; bleaching it with a filtered solution of chloride of lime, and afterwards dissolving the lime from the precipitate, by the addition of muriatic acid. The precipitate is then to be well washed in several waters, dried, and dissolved in alcohol, which takes up the more soluble portion, forming a very pale but rather thin varnish, to which a small quantity of mastic may be added.

Attempts are frequently made to combine copal with all the spirit varnishes, in order to give them greater toughness and dura-

bility; and although copal cannot be entirely dissolved, even in pure alcohol, still, a moderate portion will be taken up by strong spirit of wine when a temperature of about 120° is employed with frequent agitation of the varnish. In this manner a light-colored varnish may be made with three-quarters of a pound of shell-lac, three-quarters of a pound of copal to one gallon of spirit of wine containing about ninety-five per cent. of alcohol. The copal should be powdered quite fine, and may either be added to the shell-lac and spirit at the commencement, in which case the shell-lac should also be powdered, or the shell-lac may be first dissolved and the powdered copal added; but, in either case, it is only the more soluble portion of the copal that is taken up, and the remainder settles to the bottom in a viscid mass, from which the varnish may be decanted and strained for use. Copal may be added in the same manner to the white hard varnishes, and it is sometimes recommended to fuse the copal and drop it into water before attempting to dissolve it in spirit, but the advantage of adding copal to spirit varnishes is very questionable.

Lacker for Brass, like French polish, is made in a great variety of ways; and, as in French polish, the simplest and best pale lacker for works that do not require to be colored, consists of shell-lac and spirit of wine only, in the proportions of about half a pound of the best pale shell-lac to one gallon of spirit. Lacker is required to be as clear and bright as possible; it is, therefore, always made without heat by continuous agitation for five or six hours. The lacker is then allowed to stand until the thicker portions are precipitated, when the clear lacker is poured off, and if it should not be sufficiently clear, it is afterwards filtered through paper into a bottle, which should be kept closely corked and out of the influence of light, which would darken the color of the lacker. This may, however, be easily prevented by pasting paper round the bottle.

Colored Lackers.—Lackers are frequently required to be colored, either of yellow or red tints. For yellow tints, turmeric, cape aloes, saffron, or gamboge are employed; and for red tints, annotto and dragon's-blood are used—the proportions being varied

according to the color required. Thus, for a pale yellow, about one ounce of gamboge and two ounces of cape aloes are powdered and mixed with one pound of shell-lac. For a full yellow, half a pound of turmeric and two ounces of gamboge, and for a red lacker, half a pound of dragon's-blood and one pound of annotto. The color is also modified by that of the lac employed, the best pale or orange shell-lac being used for light-colored lackers, and dark-colored shell-lac or seed-lac is used for the darker tints. For pale lackers, sandarac is sometimes used with the shell-lac. Thus a pale gold-colored lacker is made with eight ounces of shell-lac, two ounces of sandarac, eight ounces of turmeric, two ounces of annotto, and a quarter of an ounce of dragon's-blood to one gallon of spirit of wine.

The most convenient method, however, of coloring lackers, is to make a saturated solution in spirit of wine of each of the coloring matters, and to add the solutions in different proportion to the pale lacker according to the tint required; but the whole of the coloring matters are not generally used by the same makers, and solutions of turmeric, gamboge, and dragon's-blood afford sufficient choice for ordinary purposes. The turmeric gives a greenish yellow tint, and, with the addition of a little gamboge, is the coloring matter employed in making the so-called green lacker used for bronzed works.

Another mode of making lacker: Four ounces of shell-lac and a quarter of an ounce of gamboge are dissolved by agitation, without heat, in twenty-five ounces of pure pyro-acetic ether. The solution is allowed to stand until the gummy matters not taken up by the spirit subside; the clear liquor is then decanted, and when required for use is mixed with eight times its quantity of spirit of wine. In this case, the pyro-acetic ether is employed for dissolving the shell-lac, in order to prevent any but the purely resinous portions being taken up, which is almost certain to occur with ordinary spirit of wine, owing to the presence of water; but if the lacker were made entirely with pyro-acetic ether, the latter would evaporate too rapidly to allow time for it to be equally applied.

Mastic Varnish, for painting, and similar purposes, is some-

times made in small quantities with spirit of wine; but, more generally, oil of turpentine is employed as the solvent, the proportion being about three pounds of mastic to the gallon of turpentine. For the best varnish, the mastic is carefully picked and dissolved by agitation without heat, exactly as for the best white hard varnish; after the mastic varnish has been strained it is poured into a bottle, which is loosely corked and exposed to the sun and air for a few weeks; this causes a precipitation, from which the clear varnish may be poured off for use; but the longer the varnish is kept the better it becomes.

Mastic varnish works very freely, but it is liable to chill, and the surface frequently remains tacky for some time after the varnish is applied. To prevent the latter evil, it is recommended, before dissolving the mastic, to bruise it slightly with a muller, and pick out all the pieces that are too soft to break readily, and which may be used for common varnish. To prevent the chilling, which arises from the presence of moisture, Mr. W. Neil recommends a quart of river sand to be boiled with two ounces of pearlash; the sand is afterwards to be washed three or four times with hot water, and strained each time. The sand is then to be dried in an oven, and when it is of a good heat, half a pint of the hot sand is to be poured into each gallon of varnish, and shaken well for five minutes; it is then allowed to settle, and carries down the moisture of the gum and turpentine.

In making common varnish, heat is generally employed to dissolve the mastic, and about one pint of turpentine varnish is added to every gallon of varnish.

Turpentine Varnish is made with four pounds of common resin dissolved in one gallon of oil of turpentine. It requires no other preparation than sufficient warmth to dissolve the resin. Sometimes resin and turpentine are mixed together in a stone or tin bottle, which is placed near the fire, or in a sand-bath over a stove, and shaken occasionally; but varnish-makers generally mix the resin and turpentine in the gum-pot, and employ sufficient heat to fuse the resin. This is a more expeditious practice, but is attended with some danger of fire. When a very pale turpentine

varnish is required, bleached resin is used, and care is taken not to employ more heat than is necessary in making the varnish. Turpentine varnish is principally used for in-door painted works and common painted furniture and toys. It is also frequently added to other varnishes to give them greater body, hardness, and brilliancy.

Crystal Varnish is a name frequently given to very pale varnishes employed for paper works—such as maps, colored paints, and drawings. A very good crystal varnish is made with two pounds of mastic and two pounds of damar, dissolved without heat in one gallon of turpentine. Another good but more expensive crystal varnish is made with equal quantities of Canada balsam and oil of turpentine. In making this varnish, it is only necessary to warm the Canada balsam until it is quite fluid, then add the turpentine and shake the mixture for a few minutes until the two are thoroughly incorporated. The varnish may then be placed in a moderately warm situation for a few hours, and will be ready for use on the following day. These crystal varnishes are both nearly colorless, flow freely, and are more flexible, so as to bear bending or rolling, and either of them may be employed to make a tracing paper of middling quality, by applying a thin coat of varnish on one or both sides of any thin transparent paper, such as good tissue or foreign post paper.

Paper Varnish, for paper hangings and similar purposes, is made with four pounds of damar to one gallon of turpentine. The damar dissolves very readily in the turpentine, either with moderate agitation or a very gentle heat. Sometimes white or bleached resin is used instead of the damar, or the two are combined.

Water Varnish.—All the varieties of lac may be dissolved in nearly boiling water by the addition of ammonia, borax, potash, or soda, but these alkalies all have the effect of rendering the color of the lac much darker. The solutions, may, however, be employed as varnishes, which when dried will resist the application of water sufficiently well to bear washing, especially when

the proportion of alkali employed is only just sufficient to cause the dissolution of the lac, and which is also desirable in order to keep the varnish as light-colored as possible. The least color is given with diluted water of ammonia, in the proportions of about sixteen ounces of ordinary water of ammonia to seven pints of water and two pounds of pale shell-lac, to which about four ounces of gum Arabic may be added. Borax is, however, more generally used, and the proportions are then two pounds of shell-lac, six ounces of borax, and four ounces of gum Arabic to one gallon of water. When the varnish is required to be as light-colored as possible, white lac is employed.

Sealing-wax Varnish, for coating parts of electrical machines and similar purposes, is made by dissolving two and a half pounds of good red sealing-wax and one and a half pound of shell-lac in one gallon of spirit of wine.

Black Varnish may be made with three pounds of black sealing-wax and one pound of shell-lac to the gallon of spirit, or fine lampblack may be mixed with brown hard varnish or lacker, according to the thickness required in the varnish. The interior of telescope tubes are frequently blackened with a dull varnish of this kind, made by mixing lampblack with rather thick brass lacker, as little of the lampblack being employed as will serve to deaden the bright color of the lacker. Mathematical instruments are sometimes blackened with a similar thin varnish, and the surface is afterwards brightened with one or two coats of lacker applied as usual. Ordinary lampblack, however, generally contains greasy impurities and moisture, which render it unfit for varnish purposes, and therefore the best kind should be employed, or the lampblack should be purified by ramming it hard into a close vessel, and afterwards subjecting it to a red heat. In the workshop, when small quantities of lampblack are required, it is frequently made for the occasion, by placing a piece of sheet metal over the flame of an oil lamp. A black varnish, sometimes used for metal works, is made by fusing three pounds of Egyptian asphaltum, and, when well dissolved, half a pound of shell-lac and one gallon of turpentine are added.

VARNISH FOR IRON.—Take 2 lbs. pulverized gum asphaltum, ¼ lb. gum benzoin, 1 gallon spirits of turpentine. To make this varnish quickly, keep in a warm place and shake often till it is dissolved. Shade to suit with finely ground ivory black. Apply with a brush. This varnish should be used on iron work, exposed to the weather. It is also well adapted for inside work, such as iron furniture, where a handsome polish is desired.

VARNISH FOR CANE AND BASKET-WORK.—Lac, prepared after the following recipe is used to cover split and colored cane: 25grs. of good linseed oil are heated in a sand-bath, as long as a drop of it, poured on a cold stove, does not run when the stone is inclined, and when touched with the finger it feels thready. Then is added first in small portions, 1 lb. fat copal varnish, and the vessel wherein the copal varnish is heated must be large, because by the addition of the linseed oil, a great deal of frothing takes place. When cold, the required consistence is given to the varnish by mixing it with turpentine oil. It soon dries, preserves a sufficient elasicity, and may be applied with or without addition of colors.

# POLISH REVIVERS &C.

FRENCH POLISH REVIVER.—Half pint linseed oil, 1 oz. spirits of camphor, 2 ozs. vinegar, ½ oz. of butter of antimony, ¼ oz. of spirts of hartshorn.

*Another.*—One lb. of naptha, 4 oz. of shellac, ¼ oz. oxalic acid. Let it stand till dissolved, and add 3 oz. linseed oil.

FURNITURE REVIVER.—Pale linseed oil, raw, 10 oz.; lac varnish and wood spirits, of each 5 oz. Mix well before using.

FURNITURE CREAM.—1. Cut in small pieces a quarter of a pound of yellow wax, and, after melting it, add an ounce of well powdered colophony, which is a black resin or turpentine boiled in water, and afterwards dried. The wax and colophony being both melted, pour in, by degrees, quite warm, two ounces of oil of spirit of turpentine. When the whole is thoroughly mixed, pour it into a tin or earthen pot, and keep it covered for use. The method of applying it to the furniture, which must be first well dusted and cleaned, is by spreading a little of this composition on a piece of woolen cloth, and well rubbing the wood with it, and in a few days the gloss will be as firm and fast as varnish.

2. One quarter lb. of beeswax melted in an earthenware pot; add gradually ½ pint turpentine, colored with ½ oz. alkanet root; add ½ pt. linseed oil; mix well. Should be kept in wide-mouthed bottles for use. Note.—This cream should not be used on newly polished furniture.

FURNITURE PASTE.—If it is required to keep the wood its natural color, scrape a quarter of a pound of beeswax into half a pint of turpentine. Linseed oil will darken the wood.

Six ounces of pearlash in a quarter of a pound of white wax

and simmer for half an hour in a pipkin. When cool the wax will float on the top, which must be taken off, and with hot water worked into a paste.

Equal parts of beeswax, spirits of turpentine, and linseed oil. Melt well together.

Four ounces of beeswax, ten ounces of turpentine, alkanet root to color. Melt together and strain.

To Make Furniture Paste.—Scrape two ounces of beeswax into a pot or basin; then add as much spirits of turpentine as will moisten it through. At the same time, powder an eight part of an ounce of resin, and add it, when dissolved to the consistence of paste, as much Indian red as will bring it to a deep mahogany color. Stir it up, and it will be fit for use.

Several Receipts for Furniture Cream.—Yellow wax, 4 oz.; yellow soap, 2 oz.; water 50 oz.; boil, with constant stirring, and add boiled oil and oil of turpentine, each 5 oz.

Soft water, 1 gallon; soap, 4 oz.; white wax, in shavings, 1 lb. Boil together, and add 2 oz. pearlash. To be diluted with water, laid on with a paint brush, and polished off with a hard brush or cloth.

Wax, 3 oz.; pearlash, 2 oz.; water, 6 oz. Heat together, and add 4 oz. boiled oil and 5 oz. of spirits of turpentine.

Pearlash, 1 oz.; water, 8 oz.; beeswax (genuine) 6 oz., mix with heat, and add sufficient water to reduce it to the consistency of cream; for use add more water, and spread it on the wood with a painter's brush, let it dry, and polish with a hard brush or cloth.

Beeswax, 3 oz.; pearlash, 2 oz.; water, 6 oz.; mix with heat, and add boiled oil, 4 oz.; turpentine (oil) 5 oz.; mix.

White Furniture Cream.—With the following receipt the vinegar must be mixed with the linseed oil by degrees, and the bottle well shaken up. The spirit of antimony must afterwards be added, and well mixed. Six ounces of raw linseed oil, three ozs. methylated spirit, three ozs. white wine vinegar, half an ounce of butter of antimony.

# FURNITURE POLISH.

## AN IMPORTANT FACT.

It is an undeniable fact that a good furniture polish is demanded by the trade, and for household use. Furniture by standing in warerooms becomes dusty, dirty, and lustreless; the dealer must have something with which to polish it up and make it attractive. Of course all furniture dealers have SOMETHING for this purpose, but it is well known that almost all the preparations used for this purpose produce only temporary relief, so that the furniture quickly relapses into a faded, second-hand appearance, greatly to the distress of the housekeeper and the injury of the reputation of the dealer. In households, and particularly in hotels, A REALLY GOOD furniture polish would come in almost constant use. The kind of a polish that is wanted, and that is an actual necessity, must combine the following qualities:

FIRST. It must be made of PURE GUM, then it will have a good body, thoroughly cover up scratches, bruises and stains, and impart a body that will last.

SECOND. It must give a fine lustre which will make the furniture handsome and attractive.

THIRD. It must dry quickly, so that the articles to which it is applied may be handled without delay.

FOURTH. It must be put up in convenient shape for use by the dealer, and for households and hotels, particular care being taken not to have the bottles too large, else the gum will settle to the bottom, and only the lighter ingredients be used from the top.

Such a polish dealers could sell in large quantities and make considerable money on it, and such a polish will be found in the "Can't be Beat" Furniture Polish, manufactured by H. E. Taylor & Co., 161 and 163 Bowery, New York. It has been tested for twenty years, and is now in use by thousands of dealers. Pamphlets, testimonials, terms, etc., may be had by addressing the above firm. UNDERTAKERS THROUGHOUT THE WORLD WILL STUDY THEIR OWN INTERESTS BY HAVING THEIR NAMES ON THE REGISTER OF

## H. E. TAYLOR & CO.

(SECRET INFORMATION GIVEN TO UNDERTAKERS.)

# GLUE.

GLUE.—Glue is prepared from waste pieces of skin, horns, hoofs, and other animal offal. These are steeped, washed, boiled, strained, melted, reboiled and cast into square cakes, which are then dried. The strongest kind of glue is made from the hides of oxen; that from the bones and sinews is weaker. The older the animal, the stronger the glue. Good glue should be hard in the cake, of a strong, dark color almost transparent, free from black or cloudy spots, and with little or no smell. The best sorts are transparent and of a clear amber color. Inferior kinds are sometimes contaminated with the lime used for removing the hair from the skins of which they are made. The best glue swells considerably (the more the better) when immersed in cold water, but does not dissolve, and returns to its former size when dry. Inferior glue made from bones, will, however, dissolve almost entirely in cold water.

TO PREPARE GLUE.—To prepare glue for use it should be broken up into small pieces, and soaked in as much cold water as will cover it, for about twelve hours. It should then be melted in a double glue pot, covered to keep the glue from dirt. Care must be taken to keep the outer vessel full of water so that the glue shall not burn, or be brought to a temperature higher than that of boiling water. The glue is allowed to simmer for two or three hours, then gradually melted, so much hot water being added as will make it liquid enough, just to run off a brush in a continuous stream, without breaking into drops. When the glue is done with, some boiling water should be added to make it very thin before it is put away. Freshly made glue is stronger than that which has been repeatedly melted. Too large a quantity should not therefore be made at a time. Glue may be freed from the foreign animal matter generally in it by softening it in cold water, washing it with the same several times till it no longer gives out any color,

then bruising it with the hand, and suspending it in a linen bag beneath the surface of a large quantity of water at 66° Fahr. By doing this the pure glue is retained in the bag, and the soluble impurities pass through. If the softened glue be heated to 122° without water, and filtered, some other impurities will be retained by the filter, and a colorless solution of glue be obtained.

The addition of a little bichromate of potash will render glue impervious to moisture after exposing to the light, and a small quantity of methylated spirits will greatly improve its keeping qualities.

Mixing Glue.—A minimum amount of glue should be used in good work, and it should be applied as hot as possible. The surfaces of the wood to be united should be clean, dry and true: they should be brought together as tightly as possible, so that the superfluous glue is squeezed out. The cohesion of a piece of solid glue, or the force required to separate one square inch, is four thousand pounds. The strength of common glue for coarse work is increased by the addition of a little powdered chalk. The hotter the glue, the greater its cohesion; therefore in all large and long joints the glue should be applied immediately after boiling. Glue loses much of its strength by frequent re-melting; that glue therefore, which is newly made, is much preferable to that which has been re-boiled.

Glue-Pot.—A glue-pot recently perfected consists of a circular kerosene lamp, made of tin, resting upon a tin bottom 8 ½ inches in diameter. The lamp is fitted with a tin chimney in place of glass, and fitted with a small aperture, covered with mica, so as to see how to regulate the flame. The glue pot is made of copper, tinned on the inside and supported upon a rim setting up about six inches from the bottom of the lamp, the rim supported by three legs, soldered and riveted to the rim and bottom of lamp rest. The pot in which the bottom is placed has a portion of the bottom arched, to give more heating surface, and connecting with the chamber under the pot is a flue, passing out and up alongside of the pot which carries off any smoke from the lamp, and also acts as a draft to the flame. This pot is five inches in diameter, and

about six inches high. The pot for the reception of the glue is set in the same as an ordinary glue pot, and will hold about a quart of glue. The whole can be carried to any place where you wish to use it, and still have the heat kept up. The cost of oil is but a few cents a week.

Another improvement is in the pot being of copper, tinned. It will not corrode and spoil the glue, as is the case with iron.

French cabinet-makers use a glue-pot with an inside pan made of glazed earthenware and divided radially into three divisions, in one of which is kept strong glue, in another weaker, and in the third water only, with a brush or piece of sponge for cleaning off superfluous glue from the work.

A few holes bored near the top of the inner vessel of a gluepot, by admitting steam from the outer vessel will prevent the glue from solidifying on the side. They need not be bored round the whole circumference of the pot, to allow of pouring out the glue if necessary.

To Prevent Glue Cracking.—Glue frequently cracks because of the dryness of the air in rooms warmed by stoves. The addition of chloride of calcium to glue will prevent this disagreeable property of cracking. Chloride of calcium is such a deliquescent salt that it attracts enough moisture to prevent the glue from cracking. Glue thus prepared will adhere to glass, metal, etc., and can be used for putting on labels without danger of their dropping off.

Strong Glue to Resist Moisture.—Dissolve gum-sandarac and mastic, of each a quarter of an ounce, in a quarter of a pint of spirits of wine, to which add a quarter of an ounce of clear turpentine: now take strong glue, or that in which isinglass has been dissolved; then, putting the gums into a double glue-pot, add by degrees the glue, constantly stirring it over the fire till the whole is well incorporated: strain it through a cloth, and it is ready for use. You may now return it to the glue-pot, and add half an ounce of very finely-powdered glass; use it quite hot. If you join two pieces of wood together with it, you may, when perfectly hard and dry, immerse it in water, and the joint will not separate.

GLUE TO RESIST MOISTURE.—To two quarts of skimmed milk add half a pound of the best glue; melt them together, taking care they do not boil over, and you will have a very strong glue, which will resist damp or moisture.

PORTABLE GLUE.—Boil one pound of the best glue, strain it very clear; boil also four ounces of isinglass; put it into a double glue-pot, with half a pound of fine brown sugar, and boil it pretty thick; then pour it into plates or moulds. When cold you may cut and dry them for the pocket.

This glue is very useful to draughtsmen, architects, etc., as it immediately dilutes in warm water, and fastens the paper without the process of dampening: or, it may be used by softening it in the mouth, and applying it to the paper.

# MISCELLANEOUS RECEIPTS.

To Raise Old Veneers.—First, wash the surface with boiling water, and, with a coarse cloth, remove dirt or grease; then place it before the fire, or heat it with a caul; oil its surface with common linseed oil, place it again to the fire, and the heat will make the oil penetrate quite through the veneer, and soften the glue underneath; then, while hot, raise the edge gently with a chisel, and it will separate completely from the ground: be careful not to use too great force, or the work will be spoiled. Again, if it should get cold during the operation, apply more oil, and heat it again. Repeat this process till the veneer is entirely separated, then wash off the old glue and proceed to lay it again as a new veneer.

To Take out Bruises in Furniture.—Wet the part with warm water; double a piece of brown paper five or six times, soak it, and lay it on the place; apply on that a hot flat-iron till the moisture is evaporated. If the bruise be not gone, repeat the process. After two or three applications, the dent or bruise will be raised level with the surface. If the bruise be small, merely soak it with warm water, and apply a red-hot poker very near the surface; keep it continually wet, and in a few minutes the bruise will disappear.

To Make Paste for Laying Cloth or Leather.—To a pint of the best wheaten flour add resin, very finely powdered, about two large spoonfuls; of alum, one spoonful, in powder; mix them all well together, put them into a pan, and add by degrees soft or rain water, carefully stirring it till it is of the consistence of thinnish cream; put it into a saucepan over a clear fire, keeping it constantly stirred, that it may not get lumpy. When it is of a stiff consistence, so that the spoon will stand upright in it, it is

done enough. Be careful to stir it well from the bottom, for it will burn if not well attended to. Empty it out into a pan and cover it over till cold, to prevent a skin forming on the top, which would make it lumpy.

This paste is very superior for the purpose, and adhesive. To use it for cloth or baize, spread the paste evenly and smoothly on the top of the table, and lay the cloth on it, pressing and smoothing it with a flat piece of wood; let it remain till dry; then trim the edges close to the cross-banding. If you cut it close at first, it will, in drying, shrink and look bad where it meets the banding all round. If used for leather, the leather must be first previously damped, and then the paste spread over it; then lay it on the table, and rub it smooth and level with a linen cloth, and cut the edges close to the banding with a short knife. Some lay their table-cover with glue instead of paste, and for cloth perhaps it is the best method; but for leather it is not proper, as glue is apt to run through. In using it for cloth, great care must be taken that the glue be not too thin, and that the cloth be well rubbed down with a thick piece of wood made hot at the fire, for the glue soon chills. By this method, the edges may be cut off close to the border at once.

Cements for Stopping Flaws in Wood.—Put any quantity of fine sawdust of the same wood your work is made with into an earthen-pan, and pour boiling water on it, stir it well, and let it remain for a week or ten days, occasionally stirring it; then boil it for some time, and it will be of the consistence of pulp or paste; put it into a coarse cloth, and squeeze all the moisture from it. Keep for use, and, when wanted, mix a sufficient quantity of thin glue to make it into a paste; rub it well into the cracks, or fill up the holes in your work with it. When quite hard and dry, clean your work off, and, if carefully done, you will scarcely discern the imperfection.

Mahogany-Colored Cement.—Melt two ounces of beeswax and half an ounce of Indian red, and a small quantity of yellow ochre, to bring the cement to the desired color; keep it in a pipkin for use.

CEMENT FOR TURNERS.—Melt together beeswax one ounce, resin half an ounce, and pitch half an ounce; stir in the mixture some very fine brickdust to give it a body. If too soft, add more resin; if too hard, more wax. When nearly cold, make it up into cakes or rolls, which keep for use.

This will be found very useful for fastening any piece of wood on the chuck, which is done by applying the roller of cement to the chuck and it will adhere with sufficient force.

TRACING PAPER.—A good firm tissue paper washed with a mixture of six parts spirits of wine, one of resin, one of nut oil. Apply with a sponge.

TRACING PAPER.—Canada balsam and turpentine equal parts, will make a varnish which, if applied to one side of a good thin paper, will answer well. If it is meant to take watercolor, a coat of ox gall must be laid on.

TRACING PAPER.—Dissolve a piece of white beeswax, about the size of a walnut, in half a pint of spirits of turpentine; then, having procured some very fine white, woven tissue-paper, lay it on a clean board, and, with a soft brush dipped in this liquid, go over one side, and then turn it over, and apply it to the other; hang it up in a place free from dust, to dry. It will be ready for use in a few days. Some add a small quantity of resin, or use resin instead of wax.

MOUNTED TRACINGS.—Tightly strain across an old drawing-board, by means of tacks slightly driven, a piece of cotton tolerably good quality, but do not damp it, except with paste, as hereafter mentioned. Work the last in well with a painter's brush that has not been used for any other purpose. It is advisable to soak the brush, before using, for a few hours in cold water, so as, by expansion of the handle and constriction of the cordage, to tighten the hairs, and prevent them coming out with the paste. Paste also the back of the tracing, and, obtaining the assistance of another person, hold it by the corners over the strained fabric, allowing it to sag well, and lower it gently until the middle of the tracing first come into contact with the calico, after which gently

and simultaneously lay down each corner. The tracing may now be gently dabbed with a clean cloth, commencing at the middle, and working out the blisters to the edge. A needle may sometimes be used with advantage to puncture small holes and set free the air in some of the obstinate blisters; but do not trouble to remove them all, as the smaller ones will quite disappear in drying. Do not rub the tracing whilst wet without the intervention of a sheet of large thin lining paper, such as is used for lining walls. Allow the tracing to dry gradually on the board without fire heat, and do not remove it until thoroughly dry. Draw on the scale before mounting, so that it may, by contracting and expanding with the drawing, be always true. The tracing, when mounted, presents a better surface for coloring than before. The board should be cleaned before using.

Cracks in Drawing Boards.—The material generally used in stopping the above is a composition made of glue and chalk, worked up to the consistency of putty, and applied to the board in a soft state, allowed to dry, and smoothed off with sand-paper.

To Temper Tools.—The quality of the steel should be uniform throughout; indeed, it is always better to have them tempered rather too hard than soft, for use will reduce the temper. If at any time it is necessary to perform the operation yourself, the best method is to melt a sufficient quantity of lead to immerse the cutting part of the tool in. Having previously brightened its surface, plunge in into the melted lead for a few minutes, till it gets sufficiently hot to melt a candle, with which rub its surface; then plunge it in again, and keep it there till the steel assumes a straw colour; but be careful not to let it turn blue. When that is the case, take it out, rub it again with the tallow, and let it cool. If it should be too soft, wipe the grease off, repeat the process without the tallow; and, when it is sufficiently hot, plunge it into cold spring-water, or water and vinegar mixed. By a proper attention to these directions, and a little practice, every workman will have it in his power to give a proper temper to the tools he may use. If a saw is too hard, it may be tempered by the same means; but as it would be not only expensive, but in many cases, impossible

to do it at home, a plumber's shop is mostly at hand, where the process may be repeated when they are melting a pot of lead. But here observe that the temper necessary is different to other cutting tools: you must wait till the steel just begins to turn blue, which is a temper that will give it more elasticity, and, at the same time, sufficient hardness.

HARDENING TOOLS.—A communication to the *English Mechanic*, says: "Mercury is the best liquid for hardening steel cutting tools. The best steel, when forged into shape and hardened in mercury, will cut almost anything. I have seen articles made from ordinary steel which have been hardened and tempered to a deep straw color, turned with comparative ease with cutting tools from good tool steel, hardened in mercury."

TO CUT GOOD STEEL SCRAPERS.—Part of the blade of a broken saw makes the best scrapers; but, as it is hard, it is very difficult to cut it into the required form. The best and most expeditious way is to mark it out to the size wanted, and then to place the blade or steel plate in a vice whose chaps shut very close, placing the mark even with the face of the vice, and the part to be cut to waste above the vice. Then with a cold-chisel, or a common steel-firmer that has its basil broken off, holding it close to the vice and rather inclined upwards, begin at one end of the steel plate, and with a sharp blow of the hammer it will cut it. Keep going on by degrees, and you will with ease cut it to the shape required; then grind the edges of your scraper level, and finish by rubbing it on your Turkey-stone.

TO REMEDY SPLITS IN CIRCULAR SAWS.—Three methods.

Drill a small hole in the saw at the bottom of the split.

Drill six holes about ¼ in. in diameter, along the line of the crack, taking care that one of them falls just inside it; countersink the five outer holes on both sides, and rivet nicely up with *hot* rivets slightly less in diameter than the holes.

Cut a series of dovetails across the split, and insert therein copper dovetails, which must be riveted tight by hammering on each

side. The edges of the holes must be filed to an acute angle from each side of the saw, half the thickness of it, and the copper dovetail pieces must not be quite long enough to fill the hole, but must fit in width exactly, and of course must be well annealed, and considerably thicker than the saw. When riveted, file off level with saw.

Brazing Band Saws.—Good brass, rich in copper is generally used. Bring the two ends of the saw close together and fasten, then take a small pan of charcoal, and place it under the ends and direct the flame of a blowpipe on it. As the ends will soon become red-hot sprinkle some powdered borax upon them and add the solder with a piece of iron. The way to make the solder melt; cast in ingot and file away; collect the filings, and put into solution of sal ammoniac in water, and so keep until wanted.

Saw Sharpening.—To sharpen the saw, take a triangular file, three-square file it is called, the handle in the right hand, the point of the file between the thumb and forefinger of the left hand, apply it to the front of the first tooth that leans away from the operator. Let the point of the file incline towards the point of the saw, give three or four or more rubs of the file, and the point of the tooth will be sharpened, and the front brought to a sharp edge, and as the file will have passed over the top of the next tooth it also will be filed down, and the point partly sharpened.

Now apply the file to the front of this tooth; it leans towards the operator, so the point of the file must incline towards the handle of the saw. Give, as before, three or four rubs, according to the state of the saw, and the point of this tooth will also be sharpened, and its front brought to a sharp, cutting edge. Go on in this was alternately, always remembering that when the tooth leans away from the operator the point of the file must incline to the point of the saw, and when the tooth leans towards the operator, then it must incline towards the handle of the saw.

If the saw has been sharpened before, it will be advisable to first run the file along the top of the teeth, to bring them all to a level.

Oiling Tools.—An English authority says: When a set of

bench-planes is French-polished, they certainly look very well on the bench for a short time, but the French-polish does not add to their durability or usefulness, and I think, gives them anything but a workmanlike appearance. My plan is to knock the irons out, weigh them, and then drop them into the linseed oil barrel, and let them stay there a week; I then take and weigh them again to ascertain how much oil they have absorbed. The oil goes right to the heart of the planes, and as it sets it makes them hard, and they may be depended upon for keeping their shape. Rubbing them over every dinner-hour for a week or two will give them a beautiful surface, and they will not show scratches or dints as they would if they were French-polished.

To Mark Tools.—Coat over the tools with a thin layer of wax or hard tallow, by first warming the steel and rubbing on the wax; warm until it flows and let it cool. When hard, mark the name through the wax with a graver and apply some aquafortis (nitric acid); after a few moments wash off the acid thoroughly with water, warm the metal enough to melt the wax, and wipe it off with a soft rag. The letters will be found etched into the steel.

Varnish for Tools.—Take 2 oz. tallow, 1 oz. resin; melt together and strain, while hot, to remove the specks which are in the resin. Apply a slight coat on the tools with a brush, and it will keep off the rust for any length of time.

Boiler Incrustation.—The following remedies have been used, with varying success, to prevent the incrustation of boilers.

1. Potatoes, in weight one fiftieth part that of the water, prevents the adherence of scale.

2. 12 parts of salt, $2\frac{1}{2}$ parts of caustic soda, $\frac{1}{8}$ part of extract of bark, $\frac{1}{2}$ part of potash.

3. Pieces of oak-wood, suspended in the boiler and renewed monthly.

4. 2 ounces of muriate of ammonia in the boiler twice a week.

5. A coating, consisting of 3 parts of black-lead and 18 parts of tallow, applied hot to the inside of the boiler every few weeks.

6. 12½ lbs. of molasses, fed into an 8 horse-boiler at intervals, prevented incrustation for six months.

7. Mahogany or oak saw dust in small quantities. Use this with caution, as the tannic acid attracts iron.

8. Carbonate of soda.

NON-CONDUCTING COVERING FOR STEAM PIPES.—Sawdust mixed with flour and water into a thick paste is a non-conducting covering for steam pipes, cylinders, &c. The flour should be made into a very thin paste, and then the sawdust is stirred in. The adhesion of this composition is very great when applied on clean surfaces of wrought or cast iron; but on copper pipes it is necessary to wash them first with a clay-wash, made with potter's clay, until it forms a thin coating, after which the sawdust and paste will adhere firmly. It is very simple to apply; a small trowel is all that is necessary. Lay on five successive coats one-fifth of an inch thick. Let the pipes or other objects to be covered be kept warm by the aid of a little steam, and let one coat be perfectly dry before applying a second. Should the pipes be outside, exposed to the open air, give them three or four coats of coal tar to make them waterproof, but if inside a building, it is not necessary. It is well to pass the sawdust through a riddle to cleanse it from the coarse fragments of wood which are always to be found amongst sawdust. Steam pipes so covered lose less heat than when covered by any other known or patented process sold for that purpose. It is much less expensive and much more efficient.

TO HARDEN WOOD PULLEYS.—Soft maple is often used in the construction of friction pulleys. If it is boiled in olive oil it will prove beneficial in a number of ways. It will harden the timber and render it less liable to split, but at the same time the gear will slip more after such treatment.

TO PREVENT BELTS SLIPPING.—A piece of rubber belting fastened around the belt pulley of an engine will keep the belt from slipping.

RASPS.—A farrier's rasp is an excellent tool for preparing a rough piece of wood or ivory for the lathe. Where only a small

quantity of the material is required to be removed it will be found to be more convenient than the axe or paring-knife. There is also a somewhat similar tool used by shoemakers which, for smaller jobs, will be found equally efficient.

Soft Files.—Small single-cut files or "floats" of various shapes not hardened, may be met with at some of the dealers in watchmaker's tools, which are useful in finishing small articles in hard wood, ivory, and also gold and silver; they are used sometimes by jewellers for finishing, on account of their leaving a smooth surface behind them instead of a rough one, as a cross-cut file does.

Amalgam Varnish.—Melt together equal parts of bismuth, tin and quicksilver; when melted and cooled make it into a varnish with white of egg. It is used for the varnishing of plaster of Paris figures and others of the like kind. Some people recommended lead, but lead soon becomes tarnished, but tin and bismuth will keep bright.

Painting and Preserving Ironwork.—A good black paint for coarse ironwork may be made by mixing plumbago with hot coal-tar. Equal parts of asphaltum and resin dissolved in common turpentine make also a good, cheap covering for heavy ironwork. For machinery, dissolve 2 lbs. india-rubber, 4 lbs. resin, and 2 lbs. shell-lac, in 5 galls. of benzine. This may be used with any other paint as a vehicle. Wrought-iron bridges are painted with white-lead as follows: The ironwork is first made clean by scrubbing and brushing it with wire brushes; this done, all the cavities and fissures are filled up with a putty of litharge, linseed oil, varnish, and white-lead; this filling being dry, brushing is repeated. Afterwards a paint is applied, consisting of 300 lbs. of white-lead, 10 galls. of crude linseed oil, 1 or 2 galls. of boiled linseed oil, and 1¼ gal. turpentine. This paint is repeated when sufficiently dry, and finally evenly overspread with white sand. Galvanizing is employed also to prevent rusting. A galvanizing paint consists chiefly of zinc powder and oil varnish. Rusting is further prevented by rubbing the red-hot iron with wax, tallow,

pitch, or coal-tar. Rubbing with heavy petroleum is also well adapted for keeping ironwork clean.

Preparing Soft Solder.—The following directions for soldering without fire or lamp may suit the querist: Bismuth, ¼ oz., quicksilver, ¼ oz., block tin filing, 1 oz., spirits of salts, 1 oz. Mix the whole together. Another soft solder for tin, &c. Take lead 1 part, tin 1 part, bismuth 2 parts; this melts in boiling water.

To Clean Silver Filigree.—Make a thin paste with cold water and cream of tartar, spread over ornaments thickly, fold in flannel, leave a week, then wash off with water, and they will be as good as new.

Bronzing on Metal.—The article must be chemically cleaned up brushing with a mixture of fine pumice in dilute sulphuric acid, rinsed in pure water and dried. The bronze liquor must be applied quickly and evenly with a camel's hair brush, having first heated the article, just so as it can be held without burning the fingers.

Polishing Metals.—A useful compound for polishing and cleaning metals is composed of 1 oz. carbonate of ammonia dissolved in 4 oz. water; with this is mixed 16 oz. Paris white. A moistened sponge is dipped in the powder, and rubbed lightly over the surface of the metal, after which the powder is dusted off, leaving a fine brilliant luster.

Imitation Marble.—Mix 1 lb. finely powdered lime into a thick paste with water, and add ½ lb. of colophony or, what is better, Venice turpentine. Allow the mixture to stand for some time, and then work up with it suitable quantities of fine white chalk and various colored earths, adding a few drops of olive oil if necessary. A soft mass is thus obtained, which can be moulded, like plaster of Paris, to any desired form, or it can be rolled out on a warm metal plate, or passed under wooden rollers, into thin sheets, which can be glued to the surface to be decorated, like ordinary veneers, and left to harden. It hardens and takes a good surface. Any cavities that appear must be filled up with some of the composition mixed with oil of turpentine. The composition

will keep fit for use for some time, if covered with a damp cloth while moist.

To Polish Marble.—It sometimes happens that the cabinet-maker has a table-top of marble to remount, which is scratched, and requires re-polishing. The following is the process used by the mason, and will, therefore, be acceptable in a work like the present. With a piece of sandstone with a very fine grit, rub the slab backward and forward, using very fine sand and water, till the marble appears equally rough, and not in scratches; next use a finer stone and finer sand, till its surface appears equally gone over; then, with fine emery-powder and a piece of felt or old hat wrapped round a weight, rub till all the marks left by the former process are worked out, and it appears with a comparative gloss on its surface. Afterward, finish the polish with putty-powder and fine, clean rags. As soon as the face appears of a good gloss, do not put any more powder on the rags, but rub it well, and in a short time it will appear as if fresh from the mason's hands.

To Polish Marble.—Make a thick paste with rotten stone stone and olive oil, and vigorously rub the marble with it on a cloth.

To Polish Black Marble.—Wash it with warm soap and water, and when dry rub it well with furniture paste or French polish, and then rub it with an old silk handkerchief. After one or two trials it will become quite bright.

To Clean Marble.—Mix the strongest soap-lees with quicklime, to the consistency of milk; let it lie on the stone, etc., for twenty-four hours; then clean it off, and wash with soap and water, and it will appear as new. The polish will require to be renewed by the process given above.

To Clean Marble.—Mix with ¼ pint of soap lees, ½ a gill of turpentine, sufficient pipe clay and bullock's gall to make the whole into a rather thick paste. Apply it to the marble with a soft brush, and after a day or two, when quite dry, rub it off with a soft rag. Apply this a second or third time till the marble is quite clean.

To Remove Stains on Marble.—Apply spirits of salt and carefully wash off.

To Clean Pictures.—Wash with a sponge or a soft leather and water, and dry by rubbing with a silk handkerchief. When the picture is very dirty, take it out of its frame, procure a clean towel, and making it quite wet, lay it on the face of the picture, sprinkling it from time to time with clear soft water; let it remain wet for two or three days; take the cloth off and renew it with a fresh one; after wiping the picture with a clean wet sponge, repeat the process till all the dirt is soaked out; then wash it well with a soft sponge, and let it quite dry; rub it with some clear nut or linseed oil. Spirits of wine and turpentine may be used to dissolve the hard old varnish, but they will attack the paint as well as the varnish if the further action of the spirits is not stopped at the proper time by using water freely.

Cleaning Varnished Pictures.—There are conditions where the above simple process will not accomplish what is required; where a thick coating of varnish has been applied to the picture, and it has been hung in a smoky room, and dust and dirt has been allowed to gather and remain; then it is that no high lights will be visible, the sky will be dirty, no distance visible, and perhaps the figures in the foreground very indistinct. Under these conditions the varnish must be either removed or the smoke and dirt must be brought out of the varnish. If it is thought desirable to try the latter, the following receipt will be found valuable for the purpose: 2 oz. wood naptha; 1 oz. spirits of salts; ¼ pint of linseed oil.

Mix the above well together, and before using shake the bottle. It can be used as follows: Get some soft linen rag, and make up a soft pad, which place on the mouth of the bottle and shake up some of the mixture into the pad, when commence rubbing the picture with a circular motion, and when nearly dry again give the pad another dressing of mixture, and continue this mode of procedure for some time, when the picture will gradually come out in all its detail.

CLEANING ENGRAVINGS.—Put the engraving on a smooth board, cover it thinly with common salt finely powdered. Squeeze lemon juice upon the salt so as to dissolve a considerable portion of it; elevate one end of the board so that it may form an angle of about 45 or 50 degrees. Pour on the engraving boiling water from a tea kettle until the salt and lemon juice be all washed off The engraving then will be perfectly clean and free from stains. It must be dried on the board or some smooth surface gradually. If dried by the fire or the sun it will be tinged with a yellow color.

CLEANING ENGRAVINGS.—Presuming these to be mounted, proceed in the following manner: Cut a stale loaf in half, with a perfectly clean knife; pare the crust away from the edges. Now place the engravings on a perfectly flat table, and rubbing the surface with the fresh-cut bread, in circular sweeps, lightly but firmly performed, will remove all superficial markings. Now soak the prints for a short time in a dilute solution of hydrochloric acid, say 1 part acid to 100 of water, and then remove them into a vessel containing a sufficient quantity of clear chloride lime water to cover them. Leave them there until bleached to the desired point. Now remove, rinse well by allowing to stand an hour in a pan in which a constant stream of water is allowed to flow, and finally dry off by spreading on clean cloths. Perhaps the sheets may require ironing between two sheets of clean paper.

TO SMOOTH A DAMAGED PICTURE.—Paintings sometimes get convex and concave patches on their surface, owing to pressure on one side or the other, and these inequalities cause a great deal of trouble to bring out. The most successful way is to well wet both sides of the picture on the spot, and keep it under pressure till dry. With small pictures the quickest way would be to take them off the stretcher and lay them in a press, with a light pressure between soft sheets of paper.

EMBOSSED GILDING FOR ILLUMINATING.—Gilding of figures and letters on paper and for the embellishment of manuscripts, is performed with shell gold tempered with gum water; or the

characters may be drawn with a milky solution of gum ammanacum made in water, and gold leaf applied upon them when almost dry; they may again be sufficiently moistened for receiving the gold by breathing on them. Letters raised from the surface, if paper or parchment in the manner of embossed work, such as are seen on ancient manuscripts, may be formed either by friction on a proper body with a solid piece of gold, or by leaf gold.

The former method is practised by tempering pulverizers' crystal with strong gum water, and with this paste forming the letters; when they are dry they are rubbed with a piece of solid gold as in polishing, and the letters will appear as if gilt with burnished gold. The letters are formed with an embossed figure, either of the separate letters or of whole words cut in steel, and each letter of these stamps when they are used, is oiled evenly with a feather. Then fill these concave letters with the above paste, and strike the stamps in a perpendicular direction on the paper or vellum laid on sheets of soft paper.

When the embossed letters are formed with leaf gold, the following or a similar composition must be used: Thicken beaten whites of eggs with as much vermillion as is necessary to give them the consistence of paste; use the stamps as before, and when the letters are dry moisten them by a small pencil with strong gum water, and when this is almost dry cover the letters with leaf gold, pressing it close to every part of them with cotton wool; when dry, burnish.

Gold for Illuminating.—Procure a book of leaf gold, take out the leaves gently and grind them in a mortar with a piece of honey about the size of a hazel-nut, until it is thoroughly intermixed with the gold, then add a little water and re-work it; put the whole into a phial and shake it well. Let it remain an hour or two, and the gold will deposit at the bottom of the phial.

Pour off the liquor, and add weak prepared gum in its stead; sufficient to make it flow freely from the pen or camel's-hair pencil. When required for use, shake it occasionally.

To Stain Horn in Imitation of Tortoise Shell.—Mix an

equal quantity of quicklime and red lead with strong soap lees, lay it on the horn with a small brush, in imitation of the mottle of tortoise-shell; when dry, repeat it two or three times.

To Stain Ivory or Bone Red.—Boil shavings of scarlet cloth in water, and add by degrees pearlash till the color is extracted; a little roach alum, now added, will clear the color; then strain it through a linen cloth. Steep your ivory or bone in aquafortis (nitrous acid) diluted with twice its quantity of water, then take it out, and put it into your scarlet dye till the color is to your mind. Be careful not to let your aquafortis be too strong; neither let your ivory remain too long in it. Try it first with a slip of ivory, and if you observe the acid has just caused a trifling roughness on its surface, take it out immediately, and put it into the red liquid, which must be warm, but not too hot. A little practice, with these cautions, will enable you to succeed according to your wishes; cover the places you wish to remain unstained with white wax, and the stain will not penetrate in those places but leave the ivory of its natural colour.

To Stain Ivory or Bone Black.—Add to any quantity of nitrate of silver (lunar caustic) three times its bulk of water, and steep your ivory or bone in it; take it out again in about an hour, and expose it to the sunshine to dry, and it will be a perfect black.

To Stain Ivory or Bone Green.—Steep your work in a solution of verdigris and sal-ammoniac in weak aquafortis, in the proportion of two parts of the former to one of the latter, being careful to use the precautions mentioned for staining red, as above.

To Stain Ivory, etc., Blue.—Stain your materials green according to the previous process, and then dip them in a strong solution of pearlash and water.

To Stain Ivory, etc., Yellow.—Put your ivory in a strong solution of alum in water, and keep the whole some time nearly boiling; then take them out and immerse them in a hot mixture of turmeric and water, either with or without the addition of

French berries; let them simmer for about half an hour, and your ivory will be of a beautiful yellow. Ivory or bone should dry very gradually, or it will split or crack.

To Soften Ivory.—Slice a quarter of a pound of mandrake, and put it into half a pint of the best vinegar, into which put your ivory; let the whole stand in a warm place for forty-eight hours, when you will be able to bend the ivory to your mind.

To Bleach Ivory.—Take a double handful of lime, and slake it by sprinkling it with water; then add three pints of water, and stir the whole together; let it settle ten minutes, and pour the water into a pan. Take the ivory, and steep it in the lime-water for twenty-four hours, after which boil it in a strong alum-water one hour, and dry it in the air.

Artificial Ivory.—Two parts of caoutchouc are dissolved in 36 parts of chloroform, and the solution is saturated with pure gaseous ammonia. The chloroform is then distilled off at a temperature of 85 deg. C. (185 deg. F.). The residue is mixed with calcium phosphate or zinc carbonate, pressed into moulds and dried. When calcium phosphate is used, the product possesses to a considerable degree the nature and composition of ivory.

Cement for Joining Leather.—A cement which has been found useful for this purpose may be prepared by mixing ten parts of bisulphate of carbon, one of oil of turpentine, and so much gutta-percha as is necessary to produce a thick fluidity. The leather must be first freed from all grease, which can be done by simply laying it in a cloth and pressing this with a hot iron. The parts to be joined, after being brought into contact with the cement, require to be kept pressed together until they are quite dry.

Cement for Leather and Wood.—Equal parts of pitch and gutta-percha melted together. This compound is insoluble in water.

Cement for Joining China, etc.—Beat the whites of eggs well to a froth, let them settle, add soft grated or sliced cheese

and quicklime; beat them well together, and apply a little to the broken edges. This cement will endure both the fire and water.

CEMENT FOR CHINA, ETC.—Pound half an ounce of resin and four ounces of gum-mastic; put them into a pipkin on the fire to melt; stir them well. To this add about half an ounce of finely-powdered glass, and half an ounce of quicklime; stir the whole well together. When nearly cold, form it into sticks, on a stone, in the same manner as sticks of sealing-wax are formed. When it is desired to cement any article, heat the broken edges sufficiently to melt the cement, which rub thinly on both edges; bring them accurately together; press them close, and let them cool. If this be carefully done, the work will sooner break in any other part than where the cement has been applied.

CEMENT FOR GLASS.—Steep one ounce of isinglass in half a pint of spirits of wine for twenty-four hours; then let it dissolve over a slow fire, (always keeping it covered, or the spirit will evaporate); now well bruise six cloves of garlic in a mortar, put them in a linen cloth, and squeeze the juice into the isinglass; mix all well together, and keep it for use. It is excellent to join glass ornaments, etc.

CEMENTS FOR AQUARIUMS.—Take 1 gill of plaster of Paris, 1 gill of litharge, 1 gill of fine white sand, ½ gill of finely-powdered resin. Mix well, and bottle and cork it until wanted for use, then mix it with boiled oil and dryers until as thick as putty. Mix the cement only in small quantities as it dries quickly.

Mix boiled linseed oil, litharge, red and white lead together, using white lead in the largest proportion, spread on flannel, and place on the joints.

A solution of glue, 8 oz. to 1 oz. of Venice turpentine; boil together, agitating all the time, until the mixture becomes as complete as possible, the joints to be cemented to be kept together for forty-eight hours if required.

Take ½ a gill of gold size, two gills of red lead, 1½ gill of litharge, and sufficient silver-sand to make it into a thick paste for use. This mixture sets in about two days.

To Restore the Elasticity of Cane-Chair Bottoms.—Turn up the chair bottoms, and with a hot water and sponge wash the cane-work well, so that it may be well soaked; should it be dirty, you must add soap. Let it dry in the air, and you will find it as tight and firm as when new, provided the cane is not broken.

Moths in Carpets.—Moths will work in carpets in rooms that are kept warm in winter as well as in summer. A sure method of removing the pests is to pour strong alum-water on the floor to the distance of half a yard around the edges before laying the carpets. Then once or twice during the season sprinkle dry salt over the carpet before sweeping. Insects do not like salt, and sufficient adheres to the carpet to prevent them alighting upon it.

To Destroy Moths in Carpets.—Take a wet sheet or other cloth, lay it upon the carpet, and then rub a hot flat iron over it, so as to convert the water into steam, which permeates the carpet beneath, and destroy the life of the grub.

To Clean Carpets.—The carpet being first well beaten and freed from dust, tack it down to the floor; then mix half a pint of bullock's-gall with two gallons of soft water; scrub it well with soap and the gall-mixture; let it remain till quite dry, and it will be perfectly cleansed, and look like new, as the colors will be restored to their original brightness. The brush used must not be too hard, but rather long in the hair, or it will rub up the nap and damage the article.

To Make Parchment Transparent.—Soak a thin skin of parchment in a strong ley of wood ashes, often wringing it out till it becomes transparent; then strain it on a frame, and let dry. This will be much improved if, after it is dry, you give it a coat, on both sides, of clear mastic varnish, diluted with spirits of turpentine.

Tinting on Parchment.—On a good skin you may get an even tint, as follows: After "inking in" the plan, cover (with a large color brush) rather more than the whole of it with a strong

wash of alum dissolved in water, taking care that every portion is saturated by the solution, and when dry brush away the dry alum, and the parchment will then take color almost as easily as paper, and the ink will not be disturbed.

India Ink Running.—If it is for drawing plans you may prevent it running by adding a little sugar to the India ink.

Erasing Indian Ink.—The most effective mode of erasing Indian ink lines is by rubbing the part to be erased with sandpaper of the finest quality, which will not only effectually remove the ink, but will leave a clear, smooth surface, which will take the ink better than at first, and may be colored upon.

To Make Carbon Paper.—Carbon paper, for copying or duplicating, can be made in the following manner: Take sweet oil, mixed to the consistence of cream, with either of the following paints (to produce the color desired): Prussian blue, lampblack, venetian red, or chrome green; they should be ground fine on the stone. Use rather thin but firm paper, put on with a sponge, and wipe off as dry as possible; then lay them between uncolored paper, and press by laying a weight or some other heavy flat substance upon them until the surplus oil is absorbed, when it is ready for use.

Removing Oil Stains from Tiles.—You can remove oil stains from tiles completely by mixing fuller's earth into a thick paste with water, and spreading it over the tiles, letting it remain twenty-four hours, and then wiping it off. If the mark, then, has not quite gone, put on another paste.

To Polish Floors.—Put some spermaceti into a saucepan on the fire, and mix it with enough turpentine to make it quite fluid; then with a piece of flannel put it very thinly on the floor. It must then be rubbed with a dry flannel and brushed in the same way that oak stairs are polished. This part of the process, rubbing and brushing, takes a long time to do thoroughly.

To Polish Floors.—Dissolve half a pound of potash in three pints of water, in a saucepan on the fire; when the water boils

throw in 1 lb. of beeswax, cut up in small pieces; stir well until the wax is quite melted. When the polish is cold, if it be too thick, add more water, then with a brush paint the boards evenly with it; and when it has dried rub them with a flannel tied at the end of a broom.

Black Wax.—Add one ounce of beeswax to half an ounce of Burgundy pitch; melt them together, and add one ounce and a half of ivory-black, ground very fine, and dried.

Green Wax.—Melt one ounce of beeswax, and add half an ounce of verditer; let the pipkin be large enough, as the wax will immediately boil up. Stir it well, and add the eighth part of an ounce of resin, when it will be sufficiently hard and fit for use.

To Polish Tortoise-shell or Horn.—Having scraped your work perfectly smooth and level, rub it with very fine sand-paper or Dutch rushes; repeat the rubbing with a bit of felt dipped in a very finely powdered charcoal with water, and lastly, with rotten-stone or putty-powder; and finish with a piece of soft wash-leather, damped with a little sweet oil.

To Clean Looking Glasses.—Sponge down the glass with gum and water, equal parts, then dust down with whitening, and finish with a soft old silk handkerchief.

To Remove Ink Stains.—Ink stains may be removed from a mahogany table by putting a few drops of spirits of niter into a teaspoonful of water, and touching the part stained with a feather dipped into the mixture; immediately the ink stain disappears, the place must be rubbed with a rag wet with cold water, or there will be a white mark, which will not easily be removed. Ink stains on silver or plated articles may be removed immediately and effectually without doing any injury to the things, by making a little chloride of lime into a paste with water and rubbing the stains until they disappear, and afterwards washing the article with soap and water. Ink stains may be removed from colored table covers by dissolving a teaspoonful of oxalic acid in a teacupful of hot water and rubbing the stained part well with the solution. Ink stains may be taken out of anything white by simply

putting a little powdered salts of lemon on the stain, damping it, allowing it to remain about five minutes, and then washing it out with soap and water, when the stain will disappear. Ink may be removed from boards by applying some strong muriatic acid or spirits of salt with a piece of rag and afterwards well washing the place with water.

To Remove Stains from Wood.—To half a pint of soft water put an ounce of oxalic acid and half an ounce of butter of antimony; shake it well, and when dissolved it will be very useful in extracting stains, as well as ink from wood, if not of too long standing.

To Clean Velvet.—Velvet requires very careful manipulation, as it loses its fine appearance if wrung or pressed when it is wet. To remove dust:—Strew very fine dry sand upon the velvet, and brush in the direction of the lines until all the sand is removed. The brush must be clean. To remove dirt:—Dissolve ox-gall in nearly boiling clean water, and add some spirits of wine. Dip a soft brush into this solution and brush the dirt out of the velvet. It may require repeated brushing. After this, hang it evenly up to dry. For finishing, apply a weak solution of gum by means of a sponge to the reverse side of the velvet.

To Remove Paint or Stain from Wood.—Dissolve potash in water, making a strong solution, with this wash the surface of the work, allowing it to soak a few minutes. If the paint cannot then be scraped off, give the wood another application, and repeat until the paint is removed. Afterward, wash the surface with clean water sufficiently to ensure the removal of all the potash.

To Remove Varnish from Wood.—A strong application of ordinary spirits of camphor will remove almost any kind of polish or varnish. Give the spirit time to evaporate before repolishing, or it will injure the new polish.

The solution of potash, mentioned above, will also remove varnish.

Tests for Gilding.—If a gilt surface be touched with a drop of chloride of gold or nitrate of silver solution, the former will

produce a brown, the latter a grey spot if the coating be an alloy, but will have no effect upon pure gold. For gilt paper, moisten with a drop of chloride of sulphur, which will immediately produce a dark brown margin if the covering is not pure gold. Metallic spangles shaken in close flasks with chloride of sulphur, suffer no change if gold, otherwise they gradually darken; but if under slight pressure, as in hermetically sealed tubes, gold spangles disappear in a short time by conversion into chloride of gold.

ANTI-ATTRITION.—This mixture is made of one part of plumbago or blacklead ground very fine, and four parts of hog's lard or grease, mixed well together. It prevents the effects of friction much better than oil or other grease, and is very useful the turner, and will be found to make the lathe work much easier, as well as to be a great saving in oil, which with constant use grows stiff, and sensibly impedes the motion; while this preparation, once applied, will last a long time without requiring renewal.

TO REMOVE GREASE FROM CLOTH.—Drop on the spot some oil of tartar, or salt of wormwood, which has been left in a damp place till it turns into a fluid; then immediately wash the place with lukewarm soft water, and then with cold water, and the spot will disappear.

This will be found very useful, as it frequently happens that the cloth of the card tables, and the inside flaps of secretaries, are spotted and greasy. By proceding as above, every spot of grease will be completely taken out.

PUTTY.—Painters use various kinds of putty, using varnish, japan, oil, keg lead, dry lead, red lead, whiting, zinc white, umber, yellow ocher, &c., in the composition of the various kinds. In mixing up putty the painter should always be governed by the time he may have in which to complete his work. If the work he is doing must be completed in an unreasonably short time, the putty should be mixed with very little or no oil, although a putty mixed with japan alone will dry quicker, so as to bear sandpapering in the shortest possible time, but it is a mealy, poor kind

of putty, and is apt to shrink, allowing dampness to penetrate it when rubbed with pumice-stone and water.

The best and toughest kind of putty is made of keg and dry white lead, with only a small portion of japan. In making this kind of putty, use about 4 pounds of keg lead to about a gill of japan, mixing them thoroughly together; then add dry white lead in small quantities, pounding it lightly at first, and when you have added sufficient dry lead to form a mass like dough, use the mallet or hammer very freely. If dry zinc white is used instead of dry lead, the putty will be much better. This putty should be allowed three or four days to dry. Another kind of this necessary compound is made by using keg lead and red lead. The latter is of itself a powerful dryer, consequently it does not require so much japan to dry the putty. It works very easy and adheres to the wood very tenaciously, and is not apt to swell or shrink.

THE END.

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